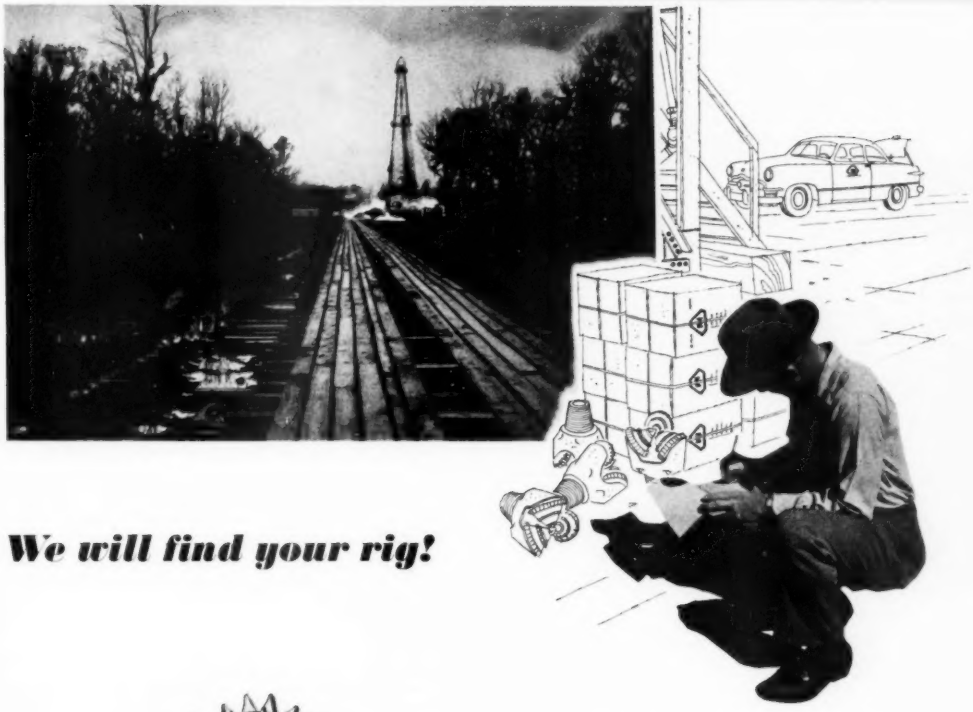
the OIL AND GAS JOURNAL



We will find your rig!

HUGHES
TRI-CONE
ROCK BITS

Your rig may be "off the beaten path" in its new location, but you can count on Hughes field men finding it. Their reputation for calling on more drilling rigs...more often ...is well earned!

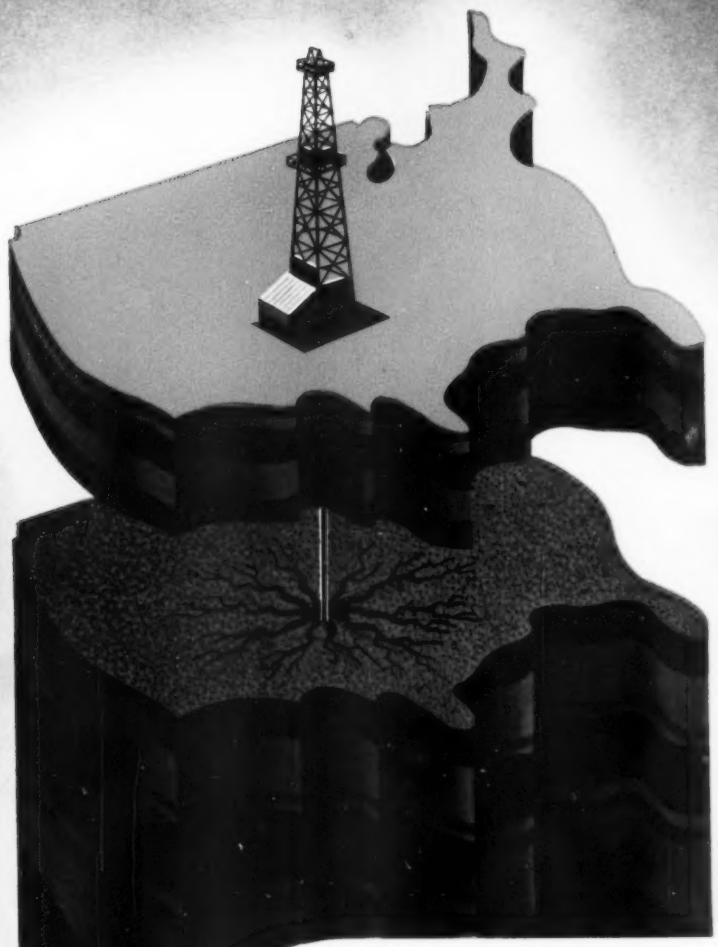
They make it their business to consistently cover every active drilling area in the United States and Canada.

You'll find, too, that they can tell you the type of rock bit that will give you the fastest, most economical footage in the formations you are likely to encounter.

You can depend on an experienced Hughes representative to be on hand when you move into new territory, and to have the right rock bit on your rig at the right time.

PRICE 50 CENTS TABLE OF CONTENTS PAGE 69 **MAY 24, 1951**

HALLIBURTON



HOWCO
IS "CRACKING" PRODUCTION RECORDS

A growing number of wells have responded with remarkable success to Howco's Hydrafrac service. There is no doubt but that well owners have available here a proved means of increasing production; with very profitable returns... Howco's Hydrafrac service is a method of hydraulically fracturing the producing formation, creating new and greater permeability within the zone being treated. This method was first used successfully in old wells to recover additional oil reserves and increase the production rate. Now it is also well established as a new completion method—and is more economical and convenient while the drilling rig is over the hole... Thorough analysis of your well by Howco will indicate whether or not Hydrafrac Service can help you crack production records. Telephone your nearest Howco representative.

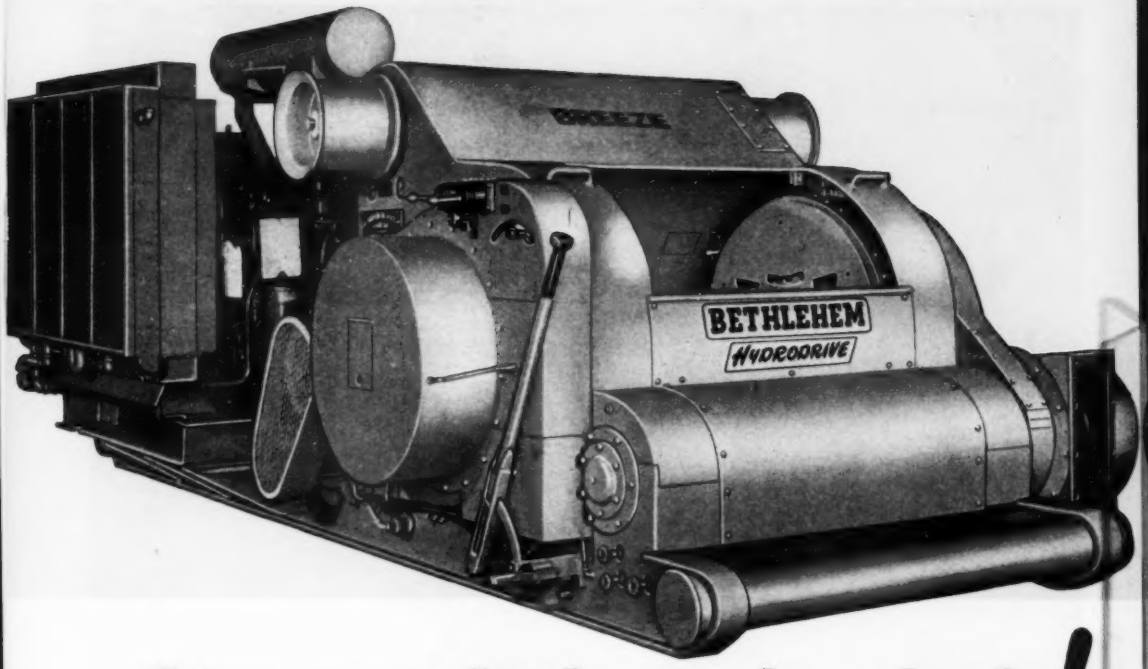
HYDRAFRAC
SERVICE

"THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING"

HALLIBURTON OIL WELL CEMENTING CO.

DUNCAN OKLAHOMA

Rotary Drilling and Workover Jobs



...this smart little rig does both!

The Bethlehem Breeze is a two-in-one unit—a dual-purpose outfit. Many owners use it primarily for shallow rotary drilling; others keep it busy on workover jobs, medium to deep. Then, there are quite a few who use it for *both* types of work.

In any of these set-ups, the Breeze is perfect. It's a strong, durable little rig that will keep punching for you month after month. Dependable. A great one to have around the job when you're 'way off a hundred miles from nowhere.

Simple to run? Sure! Only a few controls, easily mastered. Air controls, by the way.

Standard equipment includes Hydrodrive transmission and self-adjusting clutches. These two features alone are enough to assure you of smooth operation.

The Breeze doesn't cost a lot to buy and run. It does so much—so well—for so little! In fact, this thoroughly portable rig can be one of the best equipment investments you ever made.

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.

West Coast Headquarters: Los Angeles, Calif.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Famous Brands in the Southwest

PINE TREE ROCKING-H D CROSS D DIAMOND ALKALI CHEMICALS

The constant goal of Diamond Alkali Company is to serve industry over an ever-broadening front . . . to contribute to the conversion of raw materials and to better processing through all stages of manufacture. Brown & Root was particularly pleased to have the opportunity to construct the Diamond Alkali plant at Houston, Texas.

In providing plants and facilities which operate at maximum efficiency, Brown & Root has no peer. More than thirty years of operation in the Southwest has provided Brown & Root with a know-how which permits a completely integrated service, including plant location, thorough planning and supervision of construction, and delivery of a ready-to-operate plant, all under one contract . . . one responsibility.

If your company's plans call for new construction or expansion, at your invitation a Brown & Root expert will gladly make a complete survey for you. Call or write today; there is, of course, no obligation involved.

BROWN-BILT

BROWN & ROOT, Inc. *Engineers • Constructors*

P. O. BOX 3, HOUSTON 1, TEXAS

CABLE ADDRESS — BROWNBILT

Associate Companies:— BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS INC.

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

How to *INCREASE BOILER RATINGS*

with your present furnace and stack

Coppus-Dennis FANMIX Burners Give You More Heat with No Other Major Change in Equipment

Coppus-Dennis **FANMIX** Burners give you *perfect* mechanical mixing of fuel and air *at the burner outlet . . . instantaneous* ignition close to the burner . . . and *complete* combustion *without visible flame* when burning natural gas. No other burner combines these three advantages.

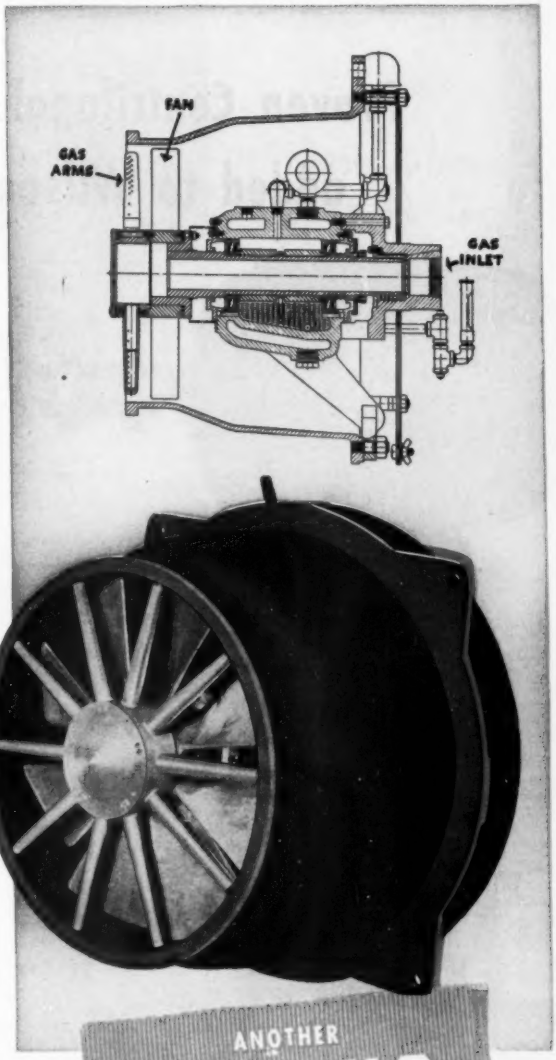
Because **FANMIX** delivers the *right* mixture of fuel and air *without blow-torch action*, all of your furnace space is used for combustion . . . *none for mixing*. That's why your present furnace can release more heat . . . why new installations can get more heat out of smaller furnace space.

Because **FANMIX** can be guaranteed to secure complete combustion of natural gas *with less than 5% excess air*, you get uniform "radiant heat" *without drifting hot spots*. That's why a **FANMIX**-fired furnace seldom varies in temperature more than 5% over its entire area.

WRITE FOR ALL THE FACTS

When you see in Bulletin 410-6 how fuel escaping from orifices in rotating driver arms rotates the fan to draw the correct proportion of air into the path of the fuel at right angles . . . how **FANMIX** creates its own forced draft, reduces stack requirements, prevents cracking of "wet" gas . . . how two **FANMIX** types handle either gas or oil or any combination of both — you'll understand why **FANMIX** Burners have such wide acceptance in oil refineries and power plants.

Send for the Coppus-Dennis **FANMIX** Bulletin **410-6**. Coppus Engineering Corporation, Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, and REFINERY CATALOG.



ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT

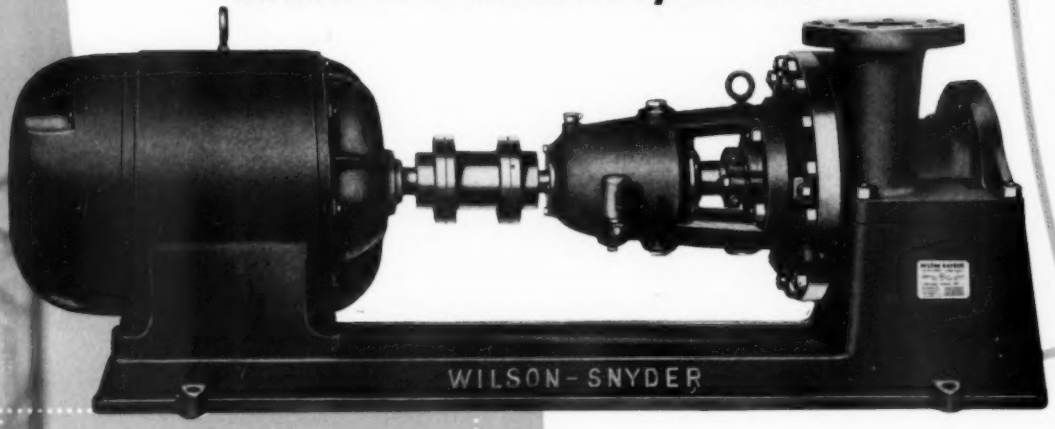
COPPUS ENGINEERING CORP.
266 Park Ave., Worcester 2, Mass.
Please send Bulletin 410-6 to:

Name .....

Company .....

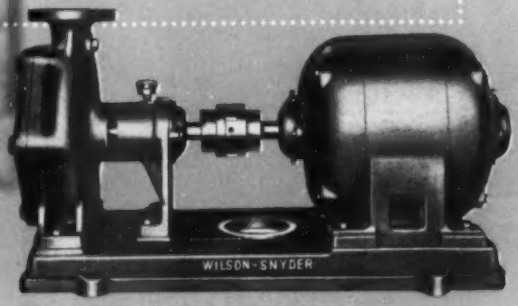
Address .....

Proven Centrifugal Process Pumps added to Wilson-Snyder line



TYPE ES . . . 14 sizes . . . Maximum interchangeability . . . Minimum parts inventory . . . . Capacities to 1600 GPM . . . Heads to 725 feet . . . Temperatures to 900°F. . . . Suction pressures to 600 psi . . . Discharge pressures to 900 psi.

TYPE CS . . . 6 sizes . . . Maximum interchangeability . . . Minimum parts . . . Capacities to 550 GPM . . . Heads to 150 feet . . . Temperatures to 200°F. . . . Discharge pressures to 200 psi.



For Refinery and Chemical Processing and General Service

OIL WELL SUPPLY COMPANY has acquired the complete line of Type ES and CS Centrifugal Pumps formerly manufactured by National Transit Pump and Machine Company, Oil City, Pa.

These pumps are being engineered and manufactured at our Braddock, Pa., Plant as WILSON-SNYDER Type ES and Type CS Centrifugal Pumps. Genuine renewal parts for pumps of this type previously manufactured by National Transit are available from us.

INQUIRIES . . . can be directed to your nearest "Oilwell" representative or to Wilson-Snyder at Braddock, Pa.

OIL WELL SUPPLY COMPANY

Branches Serving All Oil Fields

Executive Office — DALLAS, TEXAS
Export Division Office —
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Division Offices — CASPER, WYOMING
COLUMBUS, OHIO . . . DALLAS, TEXAS
HOUSTON, TEXAS . . . TULSA, OKLAHOMA
LOS ANGELES, CALIFORNIA

USS

"OILWELL"

TRADE MARK

UNITED STATES STEEL

These tubes go in to stay!

Thanks to CHASE ANTIMONIAL ADMIRALTY

(a patented alloy)

Here's the reason Chase Antimonial Admiralty* keeps heat exchanger tubes on the job year after year:

They've got *enough* antimony to resist dezincification. And antimony will not affect the metal's grain structure and won't weaken the tube.

When you get Chase Antimonial Admiralty Condenser Tubes, you're getting metal that *stays tough* . . . stands up under heavy stresses . . . lasts for years.

Years of use have proved Chase Antimonial Admiralty's superiority.

*U. S. Pat. No. 2,061,921

Special stocks of
ANTIMONIAL ADMIRALTY
Condenser Tubes in Chase Warehouses:
NEW YORK, BALTIMORE, NEW ORLEANS
LOS ANGELES
also carried by—
Vinson Supply Co., Tulsa
Standard Brass & Mfg. Co., Houston

Chase BRASS & COPPER

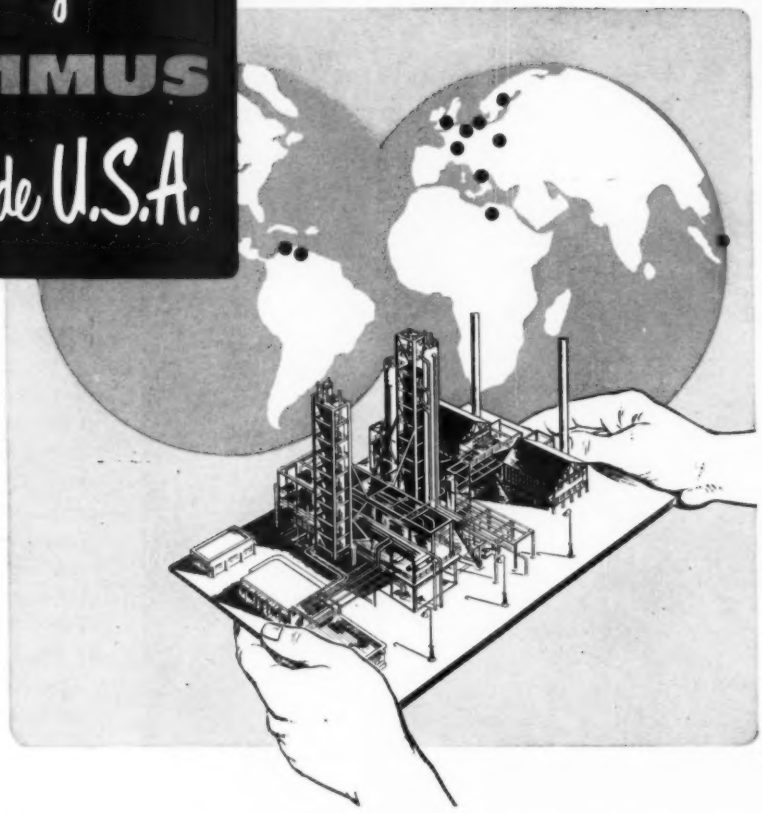
WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

• *The Nation's Headquarters for Brass & Copper*

Albany†	Cleveland	Kansas City, Mo.	New York	San Francisco
Atlanta	Dallas	Los Angeles	Philadelphia	Seattle
Baltimore	Denver†	Milwaukee	Pittsburgh	Waterbury
Boston	Detroit	Minneapolis	Providence	
Chicago	Houston†	Newark	Rochester†	(†sales
Cincinnati	Indianapolis	New Orleans	St. Louis	office only)

OGS

...by LUMMUS ...outside U.S.A.



Dots on the globe indicate countries where scores of post-war refinery and chemical projects carry the seal "... by Lummus".

All classes of Lummus service—process design, engineering, construction—are represented in these overseas projects. In a number of cases, combined projects constitute complete oil refineries.

Processes employed include distillation; propane deasphalting; catalytic and thermal cracking; reforming; Polyforming; coking; lube oil manufacture by solvent refining, solvent dewaxing and clay treating; and petroleum chemicals production.

Each job—whether just starting, partially completed, or on stream—bears the Lummus stamp of over-all competence and international experience.

We invite you to consult Lummus on *your* next project.

THE LUMMUS COMPANY

385 MADISON AVENUE, NEW YORK 17, N.Y.

CHICAGO • HOUSTON • LONDON • CARACAS • PARIS

DESIGNING ENGINEERS AND CONSTRUCTORS FOR THE PETROLEUM AND CHEMICAL INDUSTRIES

for safe and efficient handling of LP-gases

...TIGHT-SEATING CRANE LP-GAS VALVES WITH RENEWABLE DISC

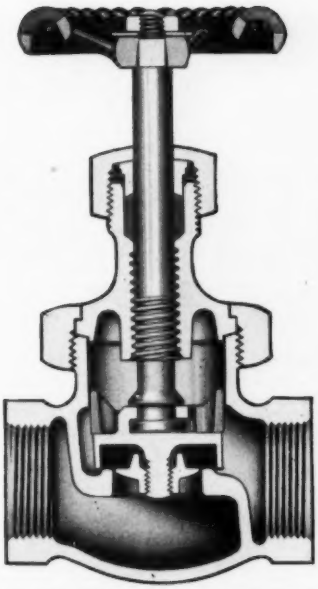
These new Crane composition disc valves—in globe, angle, and lift check patterns—carry "UL" approval for use on all common commercial forms of Liquefied-Petroleum Gases. Crane Quality construction gives added assurance of safe and efficient handling of hazardous LP-Gases.

DESIGNED FOR HARD USAGE—valve body is finest quality Crane Special Brass, with sturdy union bonnet, or cap joint on check valves. Repeated dismantling and reassembly do not affect tightness.

TIGHT SEATING—durable Crane No. 6 composition disc, cemented into disc holder to prevent leakage around disc, is soft enough for tight seating, yet tough and resilient to withstand hard usage. Wedge-type disc-retaining nut—on larger globe and angle valves—reinforces disc against strains and distortion caused by tight closure.

EXTRA-TIGHT STEM SEAL—large stuffing box filled with Crane one-piece molded asbestos packing prevents leakage around stem.

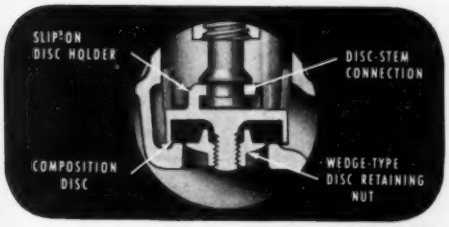
INDIVIDUALLY TESTED FOR TIGHTNESS—Each valve is tested at 600 pounds water pressure, and at 100 pounds air pressure on body and bonnet, or on body and cap on check valves, with valve open. A separate air pressure test is made for seat tightness. For further information, see your Crane Salesman or write for Folder AD-1820.

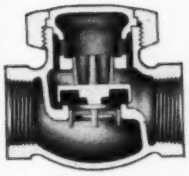


No. 130, Globe, Screwed. Working Pressures: 400 pounds gas or oil; 150° F. Max. Temp. 400 pounds water; 200° F. Max. Temp. Sizes: ¼ to 2-inch.

DESIGNED FOR QUICK CHANGE OF DISC

Composition disc can be renewed without removing valve from line. Merely open the union ring bonnet joint—or cap joint on check valves—and lift out complete disc assembly. Replace disc holder with a spare containing a new disc . . . and reassemble the valve.





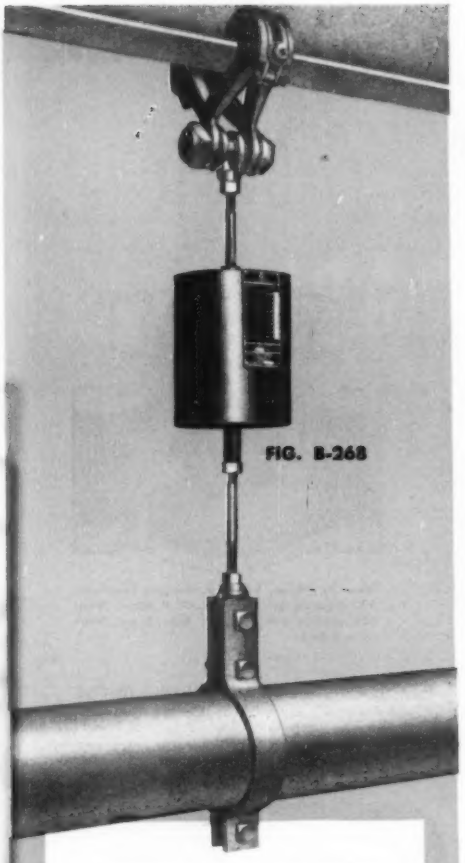
No. 132, Horizontal Lift Check, Screwed

No. 131, Angle, Screwed

CRANE CO.

General Offices:
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



Pre-solve Pipe Suspension Problems...

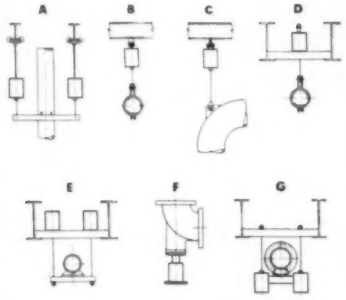
with

Grinnell Pre-engineered Spring Hangers

- Maximum variation in supporting force per ½" of deflection is 10½% of rated capacity — in all sizes.
- Precompression* assures operation of spring within its proper working range where variation in supporting force is at a minimum.
- Compact—minimum headroom made possible by precompression*.
- Guides prevent contact of coils with casing wall or hanger rod and assure continuous alignment and concentric loading of spring.
- All-steel welded construction meets pressure piping code.
- 16 sizes available from stock — load range from 74 lbs. to 9000 lbs.
- Easy selection of proper sizes from simple capacity table.
- Installation is simplified by integral load scale and travel indicators.
- Unique swivel coupling provides adjustment and eliminates turnbuckle.

*Precompression is a patented feature.

TYPICAL APPLICATIONS

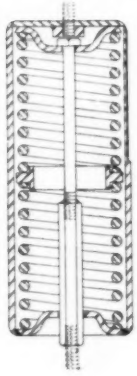


(A) Rod threaded to top cap (B) Furnished with single lug (C) Two lug style (D) Top adjusting (E) Adjustable top and bottom (F) For floor support (G) Trapeze assembly.

FOR LESS VARIATION IN SUPPORTING FORCE — FIG. 98

Fig. 98 is an adaptation of Grinnell's popular spring hanger, Fig. 268. It consists of two springs arranged in series within a single casing. A centering guide insures the permanent alignment of the spring assembly.

Fig. 98 has half the load deflection rate, and double the total working range of Fig. 268. Its 16 spring sizes accommodate loads from 74 lbs. to 9000 lbs. — but with a total working range *up to 5 inches!* Fig. 98 comes in the same seven types as shown for Fig. 268. Design details for identical types and sizes are the same for Fig. 98 and Fig. 268.



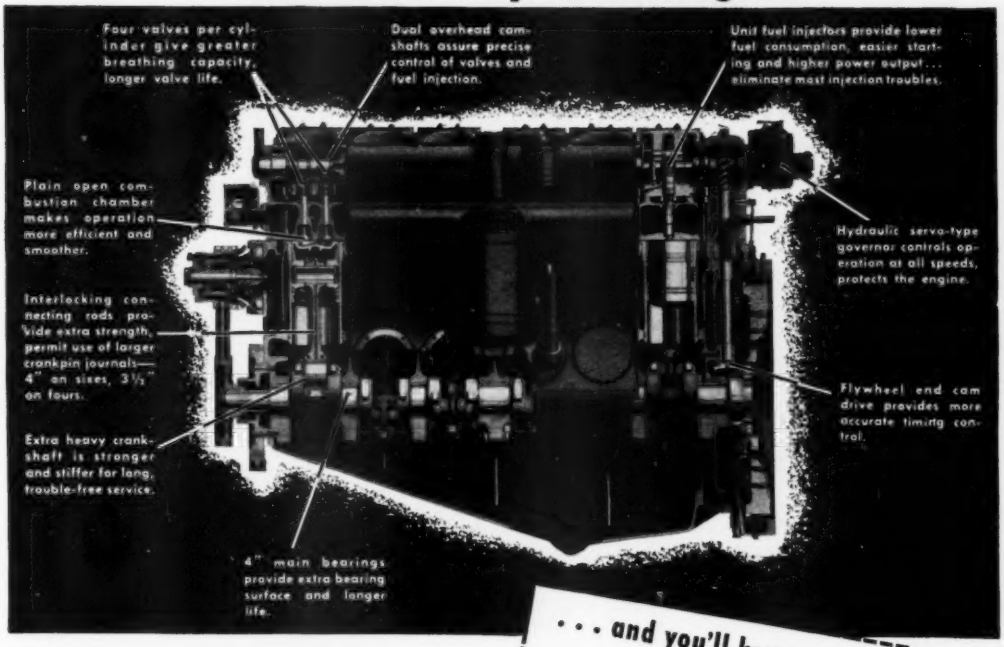
GRINNELL

WHENEVER PIPING IS INVOLVED

GRINNELL COMPANY, INC., Providence, R. I. Warehouses: Atlanta • Billings • Buffalo • Charlotte • Chicago Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

Compa MURPHY DIESEL esign

with that of any other engine


Four valves per cylinder give greater breathing capacity, longer valve life.
Dual overhead camshafts assure precise control of valves and fuel injection.
Unit fuel injectors provide lower fuel consumption, easier starting and higher power output... eliminate mast injection troubles.
Plain open combustion chamber makes operation more efficient and smoother.
Hydraulic servo-type governor controls operation at all speeds, protects the engine.
Interlocking connecting rods provide extra strength, permit use of larger crankpin journals—4" on sixes, 3½" on fours.
Flywheel end cam drive provides more accurate timing control.
Extra heavy crankshaft is stronger and stiffer for long, trouble-free service.
4" main bearings provide extra bearing surface and longer life.

. . . and you'll know why it gives you

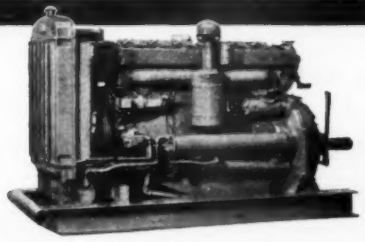
- **MORE POWER**
- **GREATER ECONOMY**
- **GREATER DEPENDABILITY**
- **LONGER LIFE**

MURPHY DIESEL

Heavy duty power

for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.



ONLY with Murphy Diesel do you get all the advanced design features described above . . . and only with Murphy Diesel do you get all extra power, economy, dependability and engine life that this design assures. Proved in thousands of hours of the toughest kind of service, this design has resulted from skilled engineering and long practical experience.

A more detailed discussion of these features and others is given in the booklet, *"10 Questions to Ask a Diesel Engine Salesman."* You can get a copy from your Murphy Diesel Dealer or we'll be happy to send you one.

MURPHY DIESEL COMPANY

5305 W. Burnham St. Milwaukee 14, Wis.

Sales, parts and service in principal centers

6 Reasons Why

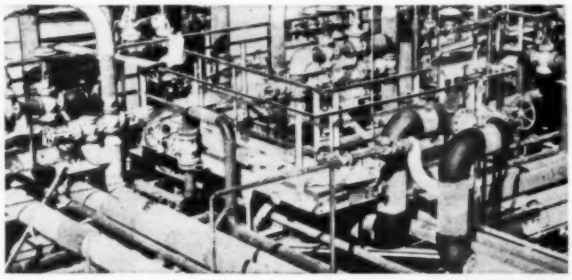
Leading Refiners Are Switching to KAYLO HEAT INSULATION

Through demonstrated superiority, Kaylo Heat Insulation is rapidly becoming recognized as the first basic advancement in the high temperature field in many years. Compare these advantages:

- Kaylo Heat Insulation is a calcium silicate (not glass)—an inorganic material which retains its stability in long service under severe conditions;
- Kaylo Heat Insulation has a wide effective temperature range—up to 1200°F.—eliminating need for combination covering in nearly all operating conditions;
- Kaylo Heat Insulation is insoluble in water. Work is not delayed by wet materials;
- High strength of Kaylo Heat Insulation practically eliminates spoilage both in transit and in application. Workmen can walk on insulated equipment without breaking insulation;
- Light weight along with high strength of Kaylo Heat Insulation makes application easier and faster;
- Simplified Dimensional Standards of Kaylo Pipe Insulation permit use of double layers for the higher temperatures without the use of special materials.

It will pay you to investigate the advantages offered by Kaylo Heat Insulation.

Applications of Kaylo Heat Insulating Block and Kaylo Pipe Insulation, The Texas Company Refinery, Lawrenceville, Illinois. M. W. Kellogg Company, New York, Designer and Builder. New construction includes units for fluid catalytic cracking, fractionation, gas recovery and catalytic polymerization.



SEE OUR CATALOG IN THE REFINERY CATALOG

For complete details on Kaylo Heat Insulation, write Dept. N-161, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

KAYLO® ... *first in calcium silicate*

...*pioneered by* OWENS ILLINOIS Glass Company

MAIN OFFICE: TOLEDO 1, OHIO—KAYLO SALES OFFICES: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND DETROIT • HOUSTON • MINNEAPOLIS • NEW YORK • OKLAHOMA CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • WASHINGTON

You can't go WRONG!

when you come to POWELL

When you install Powell Valves according to Powell recommendations, you can be sure that you have the right valves to meet the actual service conditions

There's always a Powell Valve—correct in design and materials—for every flow control service.

Quality line throughout "The Line"

Fig. 1503 — Class 150-pound, flanged end, Cast Steel O. S. & Y. Gate Valve.

POWELL

The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio

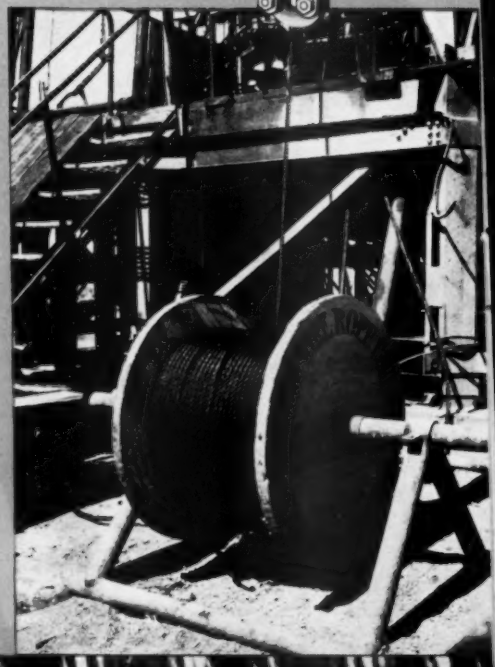
On Either Standard or Jackknife Rigs

YOU GET MORE ROUND TRIPS

with

Tuffy®

ROTARY LINE



This is not merely a manufacturer's claim. It is backed up by field tests of Tuffy Rotary Line on both standard and jackknife rigs. To make these tests, Union Engineers worked closely with drillers in the field.

The Tuffy Rotary Line is made of special steels and employs a unique construction. It has higher resistance to abrasion, shock loads, drum crushing and internal friction. These are the things that cause early rope fatigue.

On jackknife rigs, Tuffy ***Jackknife*** Rotary Line spools and reeves better and operates at higher speeds over the smaller sheaves and drums of the jackknife rig.

Tuffy ***Standard*** Rotary Line is designed for use with a standard rotary rig. It will give you maximum performance and more round trips. It is also easy to cut, when necessary, and spools well. For deeper drilling with jackknife rigs, Tuffy ***Standard*** Rotary Line is recommended.

Easy To Order

When you order Tuffy Rotary Line, you do not have to remember complicated specifications. Just give size, length and whether Tuffy **Jackknife** or Tuffy **Standard**.

Lower Wire Rope Costs By Measuring The Work Your Drilling Line Does

Now Union gives drillers a way to measure the drilling line service for the purpose of establishing the correct time for line cutting. When you know this, you can prevent cutting the line too soon or over-loading, either of which lowers ton mileage. And it will aid you in avoiding more line breaks and costly fishing operations. By measuring ton-mileage, you can make a much better showing in drilling performance.

Mail This Coupon To Have Your Ton-Mile Indicator Delivered To You

A Union field representative will bring you your free ton-mile indicator and show you how easy it is to use. He will also give you a handy Union Log Book. The indicator does all the complicated figuring for you. Merely set the figures from your log book on the indicator and read the answer. Mail the coupon today.

union Wire Rope

UNION WIRE ROPE CORPORATION

2102 Manchester Ave. Kansas City 3, Mo.

Gentlemen: Please have a Union field representative deliver my Union Ton-Mile Indicator and Log Book and explain its use.

Name_____

Address_____

City_____ Zone____ State_____

LOOK FOR THE GREEN RODS...

POINT NO. 1 EVERY JONES SUCKER ROD...

is descaled and shot peened for added fatigue strength. A more corrosion-resistant and paint-adhering surface is also produced.

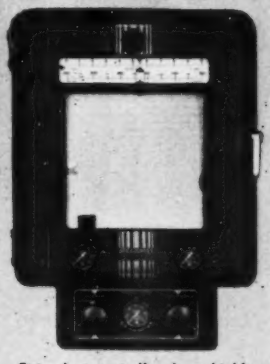
JONES

SUCKER RODS

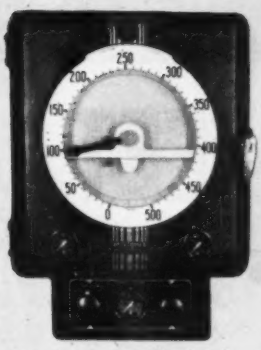
Best in the Field!

THE S. M. JONES COMPANY
Division of Buffalo-Eclipse Corporation
General Office and Factory: TOLEDO, OHIO
Sales Office: Kennedy Building, Tulsa, Okla.
Export Sales Office: Buffalo International Corp.
50 Church Street, N. Y. C.

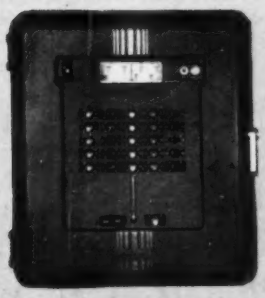
FROM COIL OUTLET TO TOWER TOP...
L&N Controls regulate vital temperatures



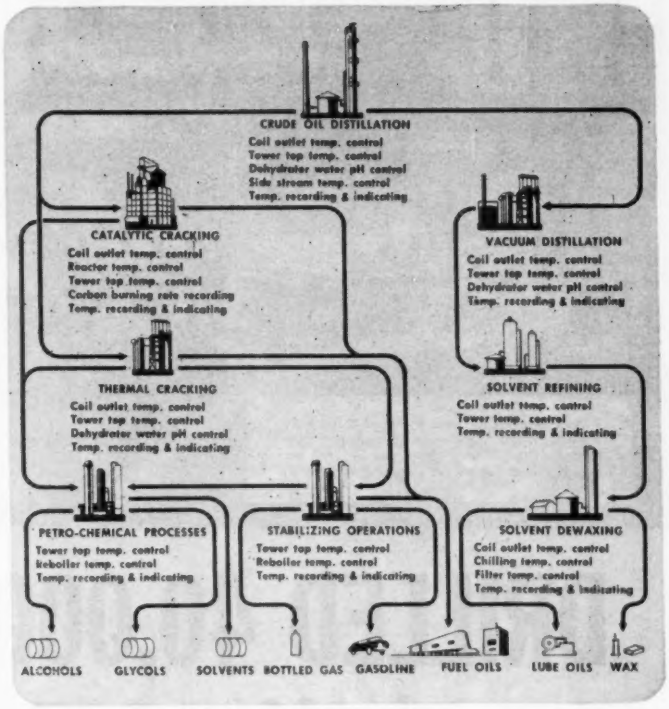
Strip-chart controller draws highly detailed record of temperature on wide, easy-to-analyze chart.



Round-chart controller has big, bold dial and pointers . . . is easily read from across a wide room.



Fast multipoint indicator takes up to 126 temperatures in record time . . . is ideal for trouble shooting as well as routine logging.



From coil outlet to tower top—from reactor temperature to dehydrator pH—L&N pneumatic controls are giving refinery men a new concept of the possibilities of modern automatic control.

Operators are especially impressed with the way the L&N system handles those ticklish situations which used to be too tough for automatic regulation. They are amazed to see how quickly it puts any unit back on stream after upset. Process engineers, too, find that this control—by eliminating swings and upsets previously considered insignificant—is boosting both quality and production.

Performance like this is possible because L&N control has wider range of adjustment, closer calibration, and greater responsiveness than we have ever before attained. Accurate *proportional band* calibration lets you gear the basic control action to your particular process. With calibrated, adjustable *rate action* you can see to it that the instrument anticipates process lags . . . counters sudden temperature changes instantaneously. And reliable *reset* setting gives the control an ever-ready reserve to check any changes of long duration.

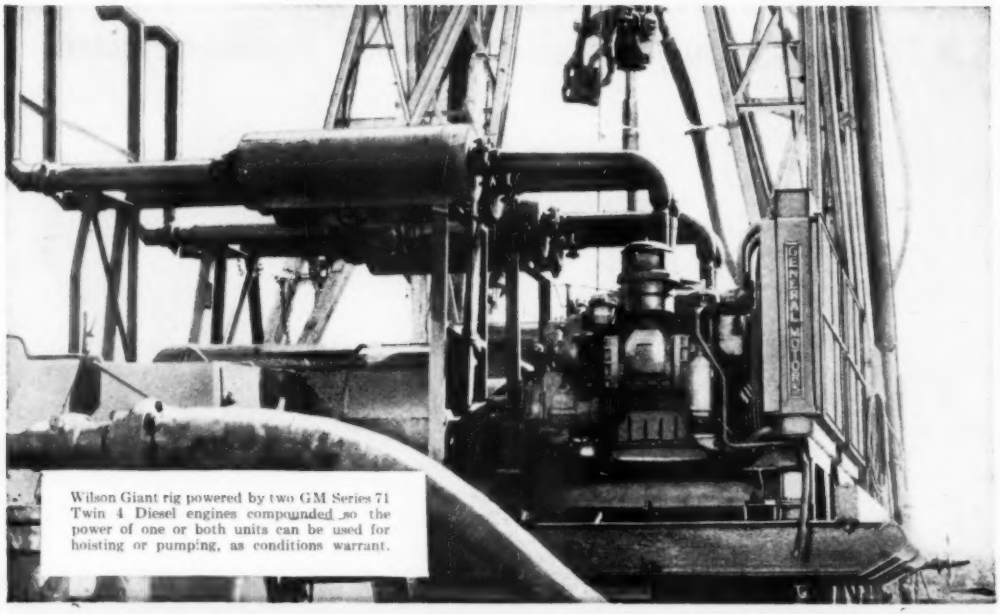
This means you can tune the control exactly to the particular lags and capacities of your process to get: (1) smaller process swings; (2) no process drift; (3) longer on-stream runs; (4) faster recovery from upsets; (5) complete versatility from the simplest to toughest jobs.

One of our nearby field engineers will help you investigate L&N controls or send catalog information, as you prefer. Just drop us a line at 4959 Stenton Ave., Phila. 44, Pa.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jrl. Ad ND4-33-702(1)



Wilson Giant rig powered by two GM Series 71 Twin 4 Diesel engines compounded so the power of one or both units can be used for hoisting or pumping, as conditions warrant.

DRILLED 40,000 FEET
in 6½ months

WHEN it comes to making hole fast—and that's the only profitable way—GM Diesel engines are in a class by themselves.

Consider, for example, the performance of this GM Diesel-powered Wilson rig operated by Wakefield Drilling Co., Wichita, Kansas. It put down 40,000 feet of hole in 6½ months.

Because these engines are two-cycle, they deliver great quantities of quick-stepping power, yet fit into compact space. They snap into action and pull out a string as fast as the crew can handle the pipe. They hum along on their job steadily with great economy of fuel and with minimum maintenance. Then when the job's done, away they go right with the unit—because rigs powered by these engines fit within road width.

All this explains why more and more drilling contractors are switching to GM Diesel power. To speed up your work and to save money, let us send you all the facts. Write for illustrated booklets, "GM Diesel Oil Field Engines" and "New GM Diesel Engine-Torque Converter Units."

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 275 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK

GM GENERAL MOTORS DIESEL POWER

the oil fields' BEST-KNOWN supply stores are

GENERAL STORES

★ that specialize

Last summer, more than 2,000 friends helped us open our modern store at Odessa, Texas. They saw a concrete, brick and steel building 430 feet long, stocked to the roof trusses with oil country goods.

Its modern building is not the secret of why this is a good oil country store. The secret is in the store's more than 12,000 stock cards. You can get anything you need for an oil well at this store. Its inventory is as fabulous as the West Texas and New Mexico oil empire it serves.

At Butler, Pennsylvania, we have another National Supply store, opened about 1895 and still operating. Texas oil men, accustomed to buying parts for their big power rigs in National Supply stores, might be disappointed by the inventory at Butler. But Pennsylvania oil and gas drillers —water well drillers, too—know it is just right for them. Pennsylvania geology dictates a different kind of drilling, and you can get anything you need for a Pennsylvania well at our Butler store.

National Supply stores always tailor their inventories to the needs of the drillers they serve. They may look like general stores to the uninitiated, but every item in each store's stock has use at the wells in its territory.

When you have everything your customers need, and your customers want every item you have, that's good storekeeping. But we carry our meticulous attention to the needs of each customer into many fields besides storekeeping.

It is part of the story behind the fame of our oil field machinery, diesel engines and tubular goods. We build them carefully to do the jobs customers expect of them. As a result, their performance usually surpasses the customers' expectations.

THE NATIONAL SUPPLY COMPANY

General Sales Offices: Toledo, Ohio

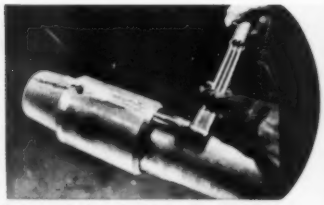
NATIONAL BLUE PRODUCTS

REPLACE TOOL JOINTS

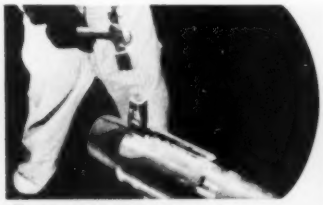
right at the Rig...

- **NO BUCKING-ON REQUIRED**
- **MINIMIZE COSTLY TRUCKING**
- **NO GALLED THREADS**
- **REDUCE SHUT-DOWN TIME**

the following steps insure Tool Joint replacement quickly, easily, economically:



1. Notch the worn Tool Joint with a torch.



2. Wedge-split for fast removal.

3. Small field furnace heats Tool Joint; water spray cools pipe, for second method of removal.

4. Apply new Tool Joint, hand tighten, mark cold position.

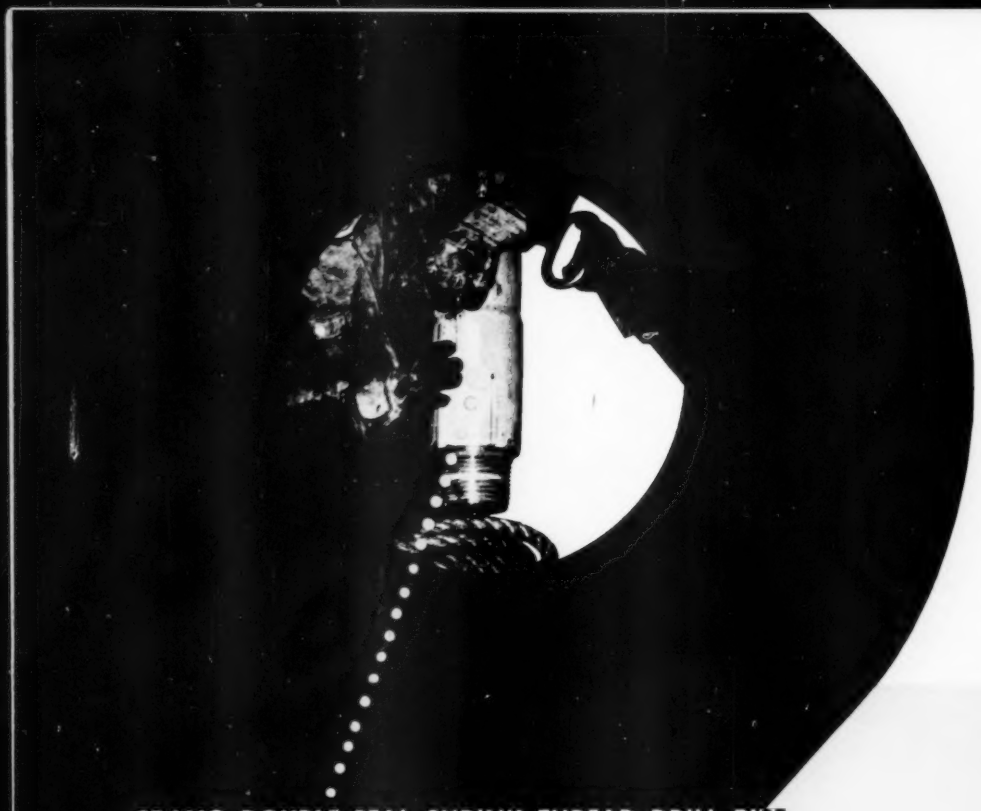
5. Heat new Joint to 800° F. in portable furnace.

6. Bring heated Tool Joint to hot position.

After cooling, Tool Joint and Drill Pipe are firmly joined, resulting in a complete bearing pressure around the entire circumference of the mating sealing surfaces.

Our engineers work constantly to improve the efficiency and dependability of these Spang Double Seal Shrink Thread Drill Pipe and Tool Joint connections.

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG PIPE • SUPERIOR & ATLAS ENGINES



SPANG DOUBLE SEAL SHRINK THREAD DRILL PIPE

AND TOOL JOINTS ARE USED WORLD-WIDE

to keep shut-downs to a minimum

to increase drilling profits

With the Spang Double Seal Shrink Thread connection, the function of the threads is to join the units. The carefully machined inner and outer seals provide the essential sealing action. The full circumference mating surfaces prevent washouts, and prohibit entry of fluids into the threads.

We'd like you to have a copy of our bulletin, "Spang Double Seal Shrink Thread Drill Pipe and Tool Joints". It's yours for the asking at your National Supply Store.

General Sales Offices: **Pittsburgh, Pa.**

DIVISION OFFICES: **Casper; Ft. Worth; Pittsburgh; Tulsa; Torrance**

CANADA: **The National Supply Company, Limited, Room 202, Alberta Block, Calgary, Alberta**

EXPORT: **National Supply Export Corporation, 30 Rockefeller Plaza, New York, N. Y., U. S. A.; River Plate House, 12 South Place, London E. C. 2**

NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY

SPANG-CHALFANT DIVISION

look at them

PIECE BY PIECE

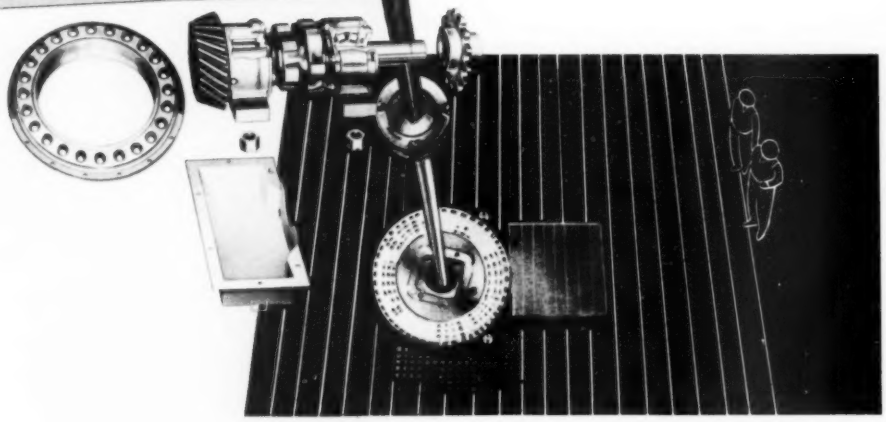
or check the job they're doing

Either way, you'll find IDEAL ROTARIES measure up to your requirements and with plenty of drilling power to spare.

That's because IDEAL ROTARIES, and all other drilling equipment in the "National Blue" line, are built to the standards of work-to-be-done rather than on the basis of first cost. And that's why IDEAL ROTARIES are so economical in the long run.

The IDEAL ROTARY line is complete, too—machines for shallow-hole drilling or high-speed deep-strata operations. Each unit has special construction features for its service range. These are described in detail in bulletins you can obtain by writing The National Supply Company.

In fact, you'll find everything that's new and everything that's standard in drilling equipment at The National Supply Company.



DIVISION OFFICES: CASPER; FT. WORTH; PITTSBURGH; TULSA; TORRANCE

CANADA: THE NATIONAL SUPPLY COMPANY, LIMITED, ROOM 202, ALBERTA BLOCK, CALGARY, ALBERTA

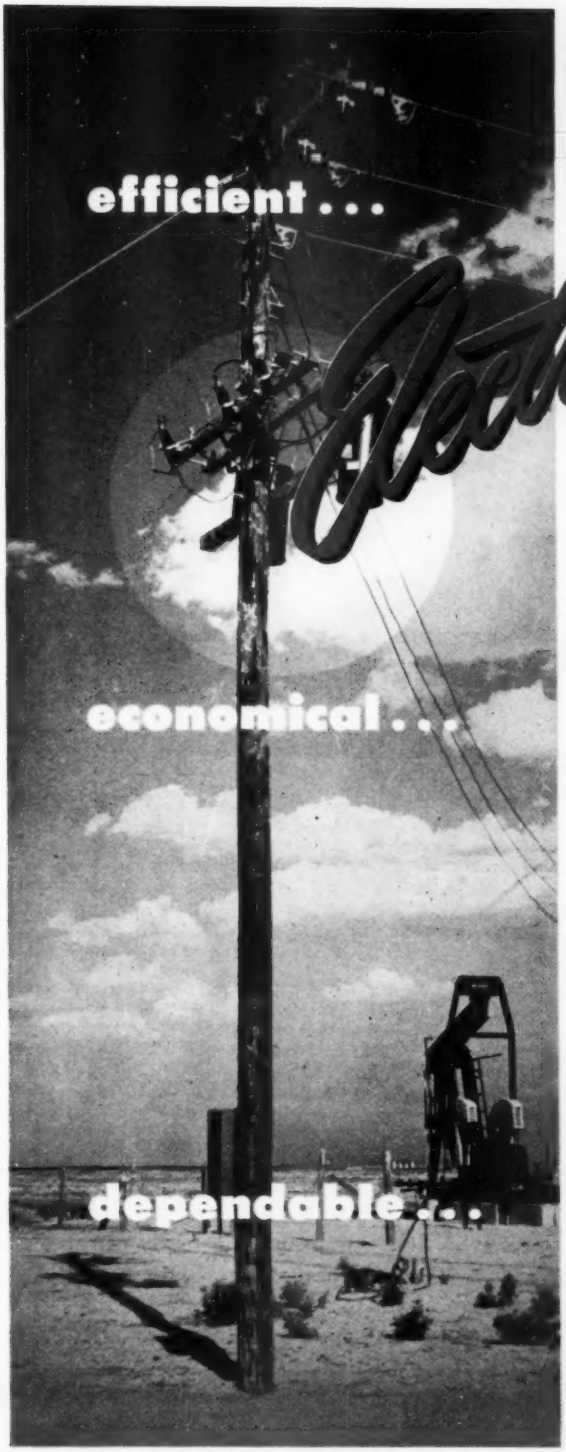
EXPORT: NATIONAL SUPPLY EXPORT CORPORATION, 30 ROCKEFELLER PLAZA, NEW YORK, N.Y., U.S.A.; RIVER PLATE HOUSE, 12 SOUTH PLACE, LONDON E. C. 2

THE **NATIONAL SUPPLY** COMPANY

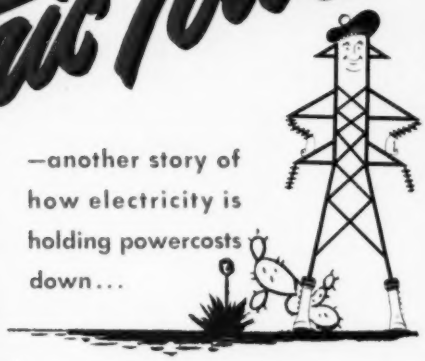
General Sales Offices: Toledo, Ohio

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG PIPE • SUPERIOR & ATLAS ENGINES

NATIONAL BLUE PRODUCTS



West Texas Pumps with Electric Power



—another story of how electricity is holding powercosts down . . .

Regardless of the locale, climate or conditions, you'll find ELECTRIC POWER efficient, dependable and at rock bottom in cost. The scene at the left is in the famed Permian Basin of West Texas, which is known for its cactus, mesquite and sandstorms as well as its oil. Here ELECTRIC POWER is on the job in every operation of the Petroleum Industry. Call the Power Engineer of your Utility Electric Power Company and let him show you how to cut down your power costs.

Petroleum Electric Power ASSOCIATION

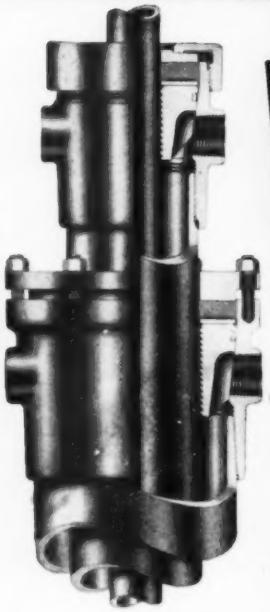
ORGANIZED
IN THE INTEREST OF GREATER SERVICE
TO THE PETROLEUM INDUSTRY

★

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS—OR ADDRESS YOUR REQUEST TO P. O. BOX 131, DALLAS, TEXAS.

•

Electric Power Does More—Costs Less



Type R Forged Steel Casing and Tubing Heads

RECTOR REDHEAD

gives you widest variety of low-pressure casing and tubing head arrangements.

Designed and manufactured by the industry's leading producer of high pressure heads, the RECTOR REDHEAD has innumerable features that put it far ahead of the field of low cost, low pressure, forged steel casing and tubing heads.

Ruggedly constructed, the bodies have greater thickness and strength than any casing or tubing to which they will be attached. Case hardened slips are three-segment type with ribbed construction to permit full flow to the outlets. An oil resistant pack-off rests on a split junk ring directly on the slips. On the casing heads this packing is secured by a split gland bolted to the head body. On the tubing head it is secured by a gland tightened down by a screw cap on top of the head.

A slip bowl adapter is available to carry slips, packing and gland so that a stripper can be carried in the tubing head body. Stripper and slips are interchangeable in bowl and head body so that two strippers can be used.

Type R Casing and Tubing Heads are available with flanged or threaded bottom connection. Male threaded and flanged drilling adapters are available for screwing on top of the Tubing Head. A special threaded mandrel is available when head is used with Kobe Pump.

Ask your nearest Rector Representative, authorized Supply Store, or write for complete details about the Rector Redhead.

● Threaded bottom Type R Tubing Head with slips and stripper. For workover jobs a second stripper can be used in place of the slips in the adapter bowl. Slips and stripper are interchangeable in head and bowl.

● The Type R Tubing Head with light flange for use on low pressure well having a flanged casing head . . . or to replace high pressure tubing head and tree when changing from flowing to pumping conditions.

● The original tubing head installation can be adapted to the Kobe Pump simply by using the special threaded mandrel with stuffing box for the power lines. The mandrel, resting on a ground joint seat, has an "O" ring seal.

● Type "R" Casing Head with threaded bottom. Notice how ribbed construction of slips permits full flow to side outlets, also simplicity and effectiveness of sealing arrangement.

RECTOR WELL EQUIPMENT COMPANY INC

★ MAKING THE OIL INDUSTRY SAFER ★

1100 NORTH COMMERCE ST. FORT WORTH, TEXAS

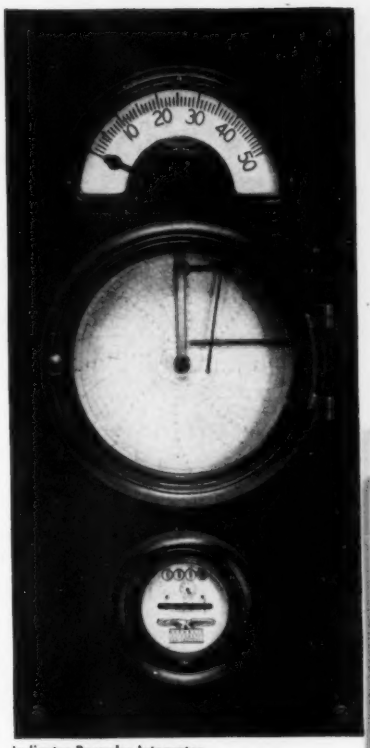
Houston Plant: 2215 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

RECTORHEAD RECTOR OIL BORE CEMENTING METHOD RECTORSEAL

ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

Integrator



Indicator-Recorder-Integrator

Varying flows are accurately totalized because the integrator is continuous

The Republic flow integrator, being of the modified watt-hour type, totalizes continuously—not intermittently. It operates independently of the recorder and its accuracy is not dependent on or affected by any clock mechanism or mechanical action.

The Republic meter is, on this account, peculiarly fitted to follow all changes in flow rate and accurately measure highly fluctuating flows.

ALL TYPES OF FLUIDS

Republic electric type flow meters are available for measuring the flow of all types of liquids and gases. Meter bodies are built for metering fluids at line pressures up to 5,000 lb. per sq. in. and for all ranges of differential pressure. The reading instruments—indicator, recorder and integrator—are of the remote reading type and can be located any distance from the point of flow measurement.

ANY COMBINATION

While each Republic reading instrument is standard in design and construction each is especially calibrated for the particular flow measurement for which it is specified. Any reading instrument, indicator, recorder or integrator, may be obtained separately or in any combination desired, making possible the highest degree of flexibility in plant use.

SIMPLE IN OPERATION

The Republic electric meter is the only flow meter commercially manufactured which is strictly electric in its operation. All other types of so called electric meters use the motion of the mercury to move a float or produce a force which is then converted into an electrical value which is in turn transmitted to a receiving or reading instrument. In the Republic meter, the transmitted electrical value is determined directly by the mercury motion, thus eliminating one of the steps in the sequence, and simplifying the mechanism to that extent. There are no floats, levers, cams, rotating shafts or anything else to interfere with the unimpeded movement of the mercury, which has no work to perform, but merely fulfills the function of making contact.

NEW DATA BOOK

Just off the press—a completely new data book describing and illustrating, in detail, the operating features of the Republic Flow Meter and its many applications. Write for your copy of Data Book No. 702—there is no obligation.

REPUBLIC FLOW METERS CO. ● 2240 DIVERSEY PARKWAY • CHICAGO 47, ILLINOIS

Lufkin PERFECTION

. . . . IN CRANK COUNTERBALANCING

"LET THE WEIGHTS DO THE WORK." Illustrated above is a very acceptable method of shifting weights on a Lufkin Pumping Unit. The crank is stopped on an incline, the three bolts are loosened and the lead bait is used as a brake. This operation is quite safe because the weights are equipped with a steel safety lug to prevent sliding off the crank.

Another acceptable method of counterbalancing a Lufkin Unit is to stop the crank on a slight incline, prying the weight along the machined ways of the crank with the aid of a bar. This method is made easy by the notched bottom of the crank slot, enabling the operator to reach the desired position by an easy sliding motion.

The Lufkin Trout Crank gives perfect counterbalance adjustment from minimum to maximum effect with the greatest of ease. One man can easily do the job. Two methods are illustrated herewith. Any method of moving the weights is safe because the weights are equipped with steel safety lugs to prevent sliding off the crank.

Operators find the Lufkin Trout Crank superior for oil field pumping units because of these outstanding features:

1. **EASE OF ADJUSTMENT**—one man can counterbalance a well.
2. **SAFETY**—a steel safety lug prevents the weights sliding off the crank.
3. **PRECISION** — counterbalance of minimum to maximum effect can be obtained by moving weights in a straight line.
4. **SIMPLICITY**—only three bolts to loosen.

LUFKIN FOUNDRY & MACHINE COMPANY
LUFKIN, TEXAS
Branch sales and service Houston, Dallas, New York, Tulsa, Los Angeles, Seminole, Oklahoma City, Corpus Christi, Odessa, Kilgore, Wichita Falls, Casper, Wyoming, Great Bend, Kansas
Lufkin Equipment in CANADA is handled by
THE LUFKIN MACHINE CO., LTD. 14321 108th Avenue, Edmonton, Alberta, Canada

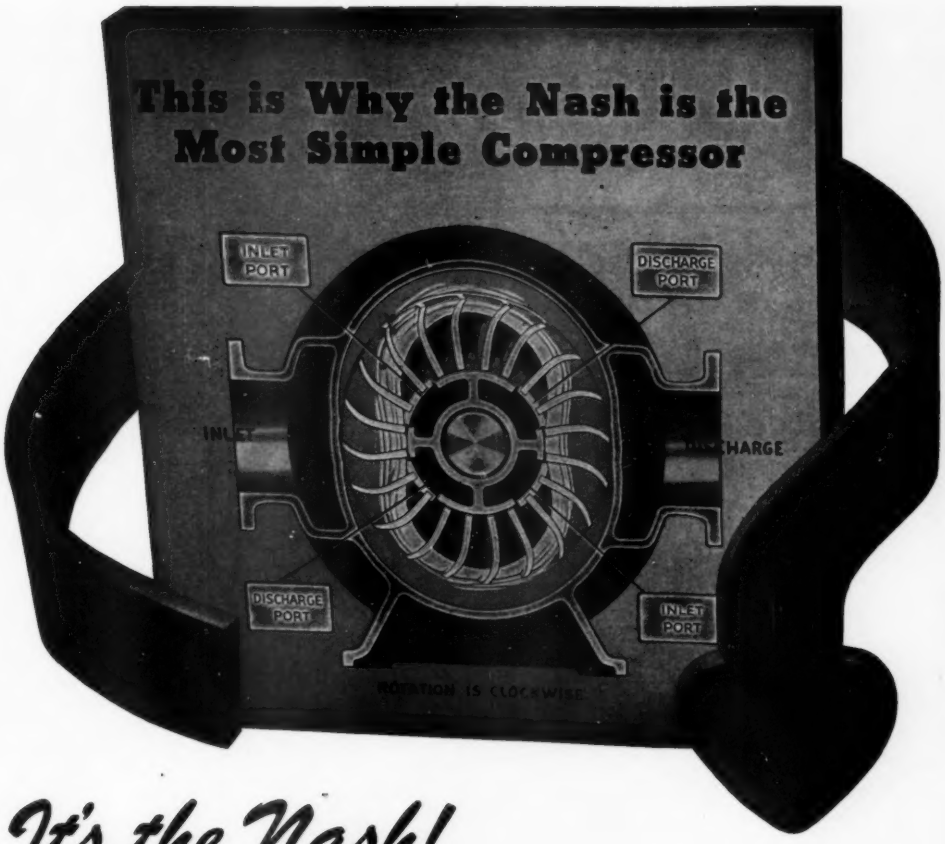
LUFKIN PUMPING UNITS

LUFKIN-COOPER-BESSEMER ENGINES

LUFKIN OIL FIELD AND INDUSTRIAL TRUCK TRAILERS

INDUSTRIAL SPEED REDUCERS AND INCREASERS

DIVISION LUFKIN FOUNDRY & MACHINE COMPANY
INDUSTRIAL, MILL AND AUTOMOTIVE SUPPLIES



It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request.

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY
322 WILSON, SO. NORWALK, CONN.

NEW

SERIES 12100*

FORGED STEEL

DROP

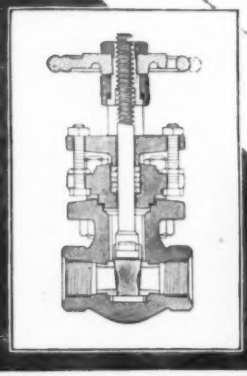
Vogt

BOLTED BONNET
BOLTED GLAND

150-800 POUND

GATE VALVES

SIZES 1/4" to 2"



*Series 12100

CARBON STEEL { 800 Pounds @ 750° F.
1500 Pounds Cold Non-Shock

For 150-800 pounds service • Round Bolted Bonnet • Bolted Gland • Gasket or Ground Joint • Outside Screw and Yoke • Renewable Seat Rings • Solid Wedge — Slotted Type • Rising Stem 11½-13% Chrome Stainless Steel Trimmings • Sizes 1/4" to 2" inclusive.

HENRY VOGT MACHINE CO. *Louisville 10, Ky.*

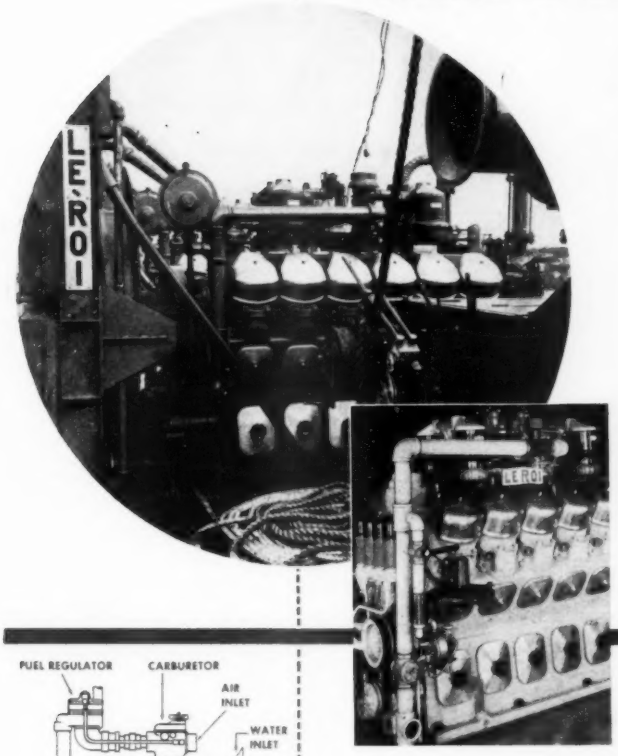
BRANCH OFFICES: NEW YORK • PHILADELPHIA • CLEVELAND • CHICAGO • ST. LOUIS • DALLAS

For Multi-fuel Versatility

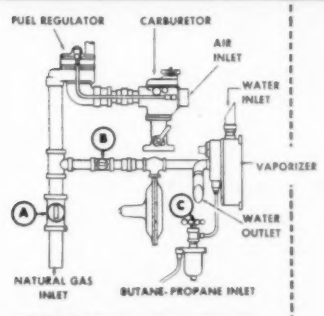
Choose a Gas Engine with

ENSIGN

COMBINATION NATURAL GAS AND BUTANE-PROPANE CARBURETION



Here's a dandy. LE ROI'S popular L-3460 600 horsepower Gas Engine with ENSIGN Carburetor for Natural Gas or Butane-Propane. Change to either fuel instantly with engine running. Dry gaseous fuel in this LE ROI assures economy and long engine life — low upkeep.



ENSIGN Butane-Propane equipment, added to the regular ENSIGN Natural Gas set, is put into operation by closing Gas Valve A and opening Butane-Propane Valves B and C.

DRILLING ENGINES. Working in one field today, another tomorrow. On many locations low cost Natural Gas is at hand. Frequently wells are spudded in with Butane-Propane engines and later switched over to Natural Gas. Simply open and close a pair of fuel control valves—no need to stop the engine. You can't beat that for ease and versatility. With the ENSIGN Combination Carburetor, your engine can run on Gasoline with Natural Gas and Butane-Propane as alternates.

If you want real power, economy, dependability, and low-cost maintenance, *CHOOSE A GAS ENGINE.*

ENSIGN CARBURETOR COMPANY

7010 South Alameda Street
Huntington Park, California

2330 West 58th Street
Chicago 36, Illinois

DEALERS AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

You Don't Have to PLAN Oil Field Housing

Want designs for homes, warehouses, bunk houses, garages or tool houses? We have them. Stop worrying about designs and floor plans. Just look over our many designs of STURDYBILT, prefabricated, demountable buildings . . . select the ones you want, and we do the rest. One purchase order takes care of everything . . . fabricating, transporting and erecting. And, you can move into your new oil field camp many weeks before you could build custom made houses.

WRITE FOR INFORMATION

MANUFACTURERS OF SPECIAL MILLWORK
DISTRIBUTORS OF
JOHNS-MANVILLE BUILDING MATERIALS
CURTIS WOODWORK

STURDYBILT

SOUTHERN MILL & MANUFACTURING CO.
Tulsa, Oklahoma

Prefabricated, Demountable Houses

PREFABRICATED HOME MANUFACTURERS' INSTITUTE phmi

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125-45 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

WELDOLETS

WELDING FITTINGS FOR ANY PIPING SERVICE

NATURAL GAS COMPRESSOR STATION PIPING CONSTRUCTED ECONOMICALLY AND EFFICIENTLY USING WELDOLET WELDING FITTINGS THROUGHOUT

This installation, together with a number of important applications of WeldOlet Welding Fittings in various types of service is shown in the new Bonney W-3 WeldOlet Catalog.

The completely new Bonney catalog will furnish descriptions, dimensional information and installation instructions. The technical section demonstrates graphically how WeldOlet Welding Fittings offer the quickest, safest and most economical method of establishing and maintaining 100% pipe strength at branch connections in accordance with code requirements.

Write for your free copy to: BONNEY FORGE & TOOL WORKS 360 State St., Allentown, Pa.

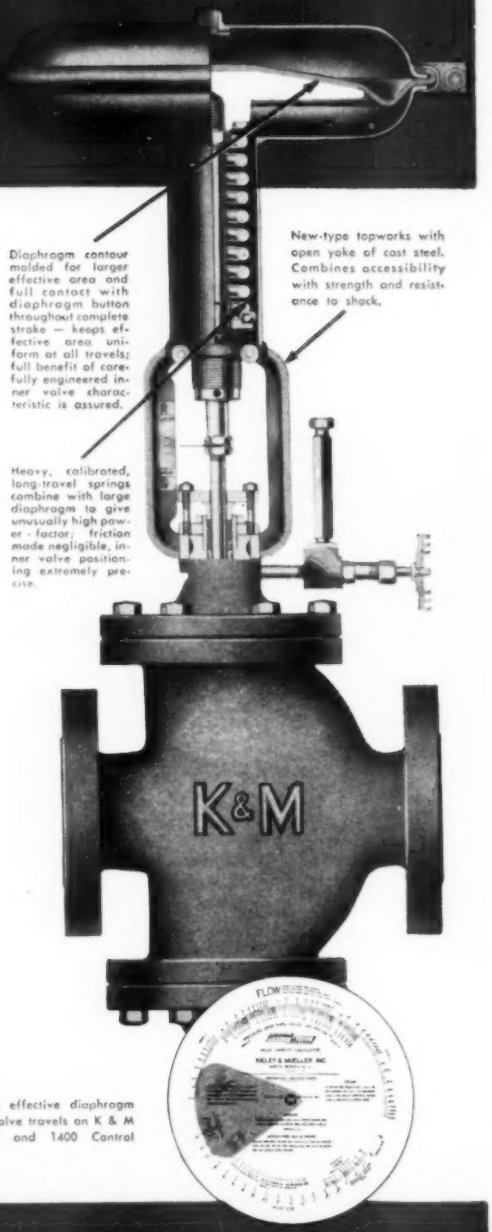
Export Distributor: NATIONAL SUPPLY EXPORT CORP., 30 Rockefeller Plaza, N. Y.

K&M The Control Valves with

GREATER POWER *for* GREATER ACCURACY

The Diaphragm Motor of the far-advanced K & M Control Valve is designed for the more exacting needs of modern process industries. An unusually high power-factor is obtained by the carefully-engineered relationship of large effective diaphragm area and heavy, calibrated spring; friction is negligible, inner valve positioning more precise. The diaphragm is specially designed for constant affinity with the button contour; this assures a uniform effective area throughout the complete valve stroke, thus more uniformly accurate control. The unusually large area of the diaphragm in relation to the valve size also helps assure more precise control.

K & M motors are available for direct action or reverse action without change in effective area or stroke.


Diaphragm contour molded for larger effective area and full contact with diaphragm button throughout complete stroke — keeps effective area uniform at all travels; full benefit of carefully engineered inner valve characteristic is assured.
New-type topworks with open yoke of cast steel. Combines accessibility with strength and resistance to shock.
Heavy, calibrated, long-travel springs combine with large diaphragm to give unusually high power - factor; friction made negligible, inner valve positioning extremely precise.
K&M

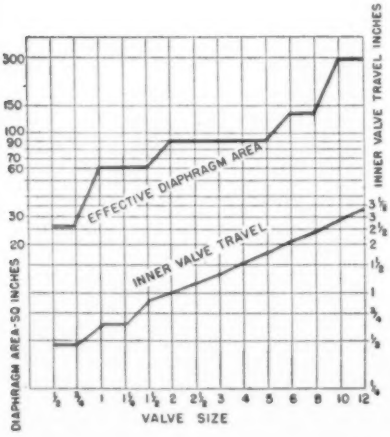


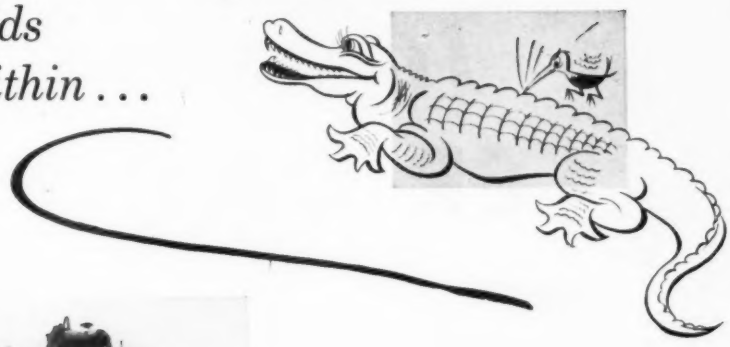
Chart shows effective diaphragm areas and valve travels on K & M Series 1200 and 1400 Control Valves.

KIELEY & MUELLER

Established 1879

North Bergen, N. J.

Like the 'Gator's tough skin that shields what's within . . .



Johns-Manville Asbestos Felts shield oil and gas pipelines

Johns-Manville Asbestos Pipeline Felt—*the only type of wrapper that has survived more than 50 years of service in all types of soil*—now protects more than 100,000 miles of oil and gas pipelines!

A sturdy, inorganic product, Johns-Manville Asbestos Felt resists rot and decay, stands up in both acid and alkali soils. It has the thickness and toughness needed to shield pipeline enamels from earth load and soil stresses. And it permits the protective enamel coating to properly function against corrosion.

Johns-Manville Asbestos Felt is flexible; wraps easily without cracking. It guards enamel from impact damage both during installation of field-wrapped pipe, and during transportation and installation of mill-wrapped pipe.

There are important economic advantages, too! In addition to reducing maintenance expense, Johns-Manville Asbestos Felt adds many years of life to the pipeline. For further information and a sample of Johns-Manville Asbestos Pipeline Felt, mail the coupon below.

Johns-Manville
Asbestos
PIPELINE FELT

Johns-Manville
Box 290, New York 16, N. Y.

Please send me a copy of the sample folder on Johns-Manville Asbestos Pipeline Felt, PP-22A.

Name_____

Address_____

City_____ Zone____ State____

Increase
FILTER CAPACITY

with

PALMER
FILTER BED AGITATORS

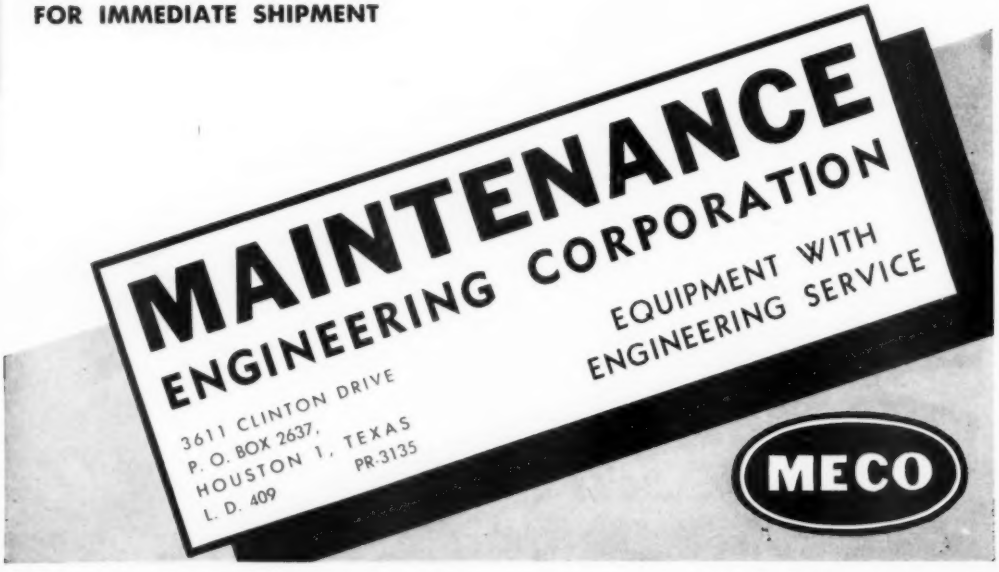
and

ANTHRAFILT
FILTER MEDIA

LOCAL STOCK AVAILABLE
FOR IMMEDIATE SHIPMENT

You'll get increased filter capacity without expensive additions to your plant when you install PALMER FILTER BED AGITATORS . . . when you change to ANTHRAFILT FILTER MEDIA. Repeated tests prove that you get longer runs at higher rates with less wash water consumption.

We suggest you try AGITATORS and ANTHRAFILT in one of your filters; you will eventually ask us to equip your entire plant.



"We all use seamless for drill pipe — and it's best for casing and tubing, too!"

● Nobody takes chances on drill pipe. Failure is simply too expensive. Drill pipe is made only in *seamless* because drillers know that all-seamless construction is the *only* construction that has the high safety margin necessary for tough drilling jobs.

The same advantages apply to seamless *casing* and *tubing*. It's the one sure way to get uniform wall strength, smooth make-up, tough joints and high collapse resistance.

All National Tube Company Drill Pipe, Casing, and Tubing is seamless. Each tube is pierced from a billet of fine steel. This piercing operation is one of the most drastic forming operations in the steel business—but it gives the strongest, most dependable tubular section that money can buy.

When planning for future strings of oil country tubular goods, remember the advantages of all *Seamless* construction. You can't buy anything better.

WALLS WITHOUT WELDS

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

NATIONAL SEAMLESS PIPE AND TUBES

UNITED STATES STEEL

CORROSION NOW POSES A DOUBLE THREAT

Worn out and corroded equipment may not be replaceable

Don't take chances on vital equipment. Scarce metals and materials are becoming scarcer. Farsighted business men are rebuilding, repairing and *protecting* to insure continuity of their operations.

Do these two things today:

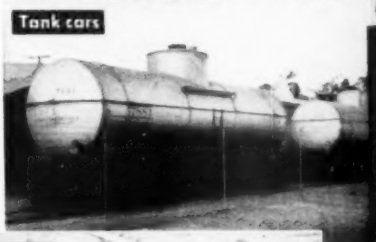
1. Check up in your plant—manufacturing equipment, piping, valves, tanks, motors, and all similar items.
2. Arrange to protect them with Amercoat—the corrosion-resistant coatings; each designed to meet specialized conditions.

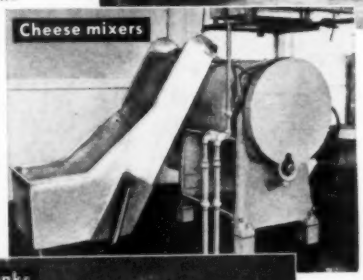
Note: Most conventional coatings fail under severe service conditions. They are neither designed nor suitable for such applications.

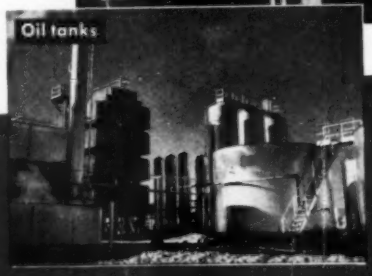
AMERCOAT CORPORATION

A Division of American Pipe and Construction Co.
4809 Firestone Blvd., South Gate, California

FOLLOW THE LINE OF *most* RESISTANCE

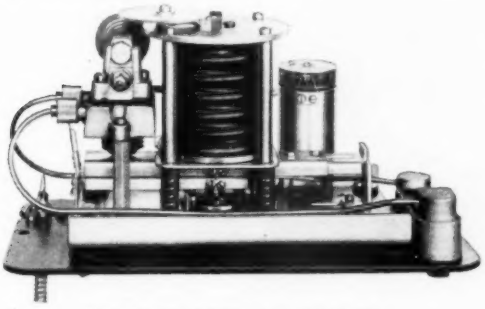






DYNAMIC ACCURACY means more today than ever before!

Accurate Measurement of changing temperatures and pressures is the vital first step in instrumentation, whether indicating, recording or controlling. Today, TRANSAIRE* Transmitters set new standards for sensitive and accurate measurement.



TEMPERATURE:

Taylor TRANSAIRE Temperature Transmitter with Speed-Act* lets you measure and transmit smallest temperature changes up to 1000 feet with great accuracy! The *only* temperature transmitter that gives you:

1. DYNAMIC ACCURACY—which means the accuracy of an instrument in measuring changing or dynamic conditions. TRANSAIRE Dynamic Accuracy is unparalleled. Solves the problem of process engineers who realize that an instrument accurate to a fraction of a degree in measuring static conditions can be in error by many degrees when temperature is changing.

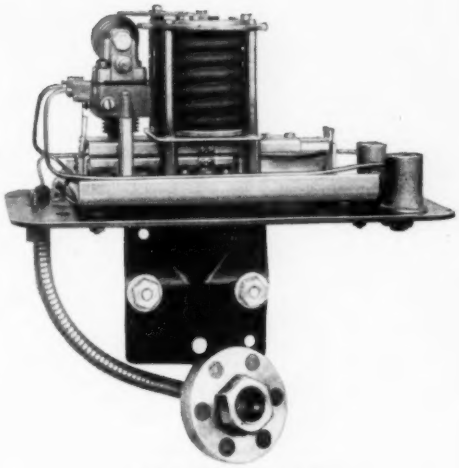
2. DYNAMIC COMPENSATION—which means ability to compensate for inherent lags both in measuring system and rate of heat transfer of process medium. TRANSAIRE does this by introducing derivative action (Speed-Act) into *measuring* circuit. The result is Dynamic Accuracy, with a speed of response seldom thought possible, permitting much closer automatic temperature control.

TRANSAIRE is the first step in Taylor's TRANSET* Control System. Step No. 2 is the Taylor TRI-ACT* Controller. Step No. 3 is the Taylor TRANSET Recorder or Indicator. All three combine into the already famous complete Taylor TRANSET Control System. **Write for Bulletin 98097.** Taylor Instrument Companies, Rochester, N.Y., and Toronto, Canada.

*Trade-Mark

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

Taylor's Centennial — ACCURACY FIRST SINCE 1851



PRESSURE:

Taylor TRANSAIRE Pressure Transmitter with narrow range spans lets you measure and transmit minute pressure changes up to 1000 feet. Works on simple force-balance principle. Accurate to ½% of the selected short range span (*conventional devices are only accurate up to ½% of upper range limit*). Sensitive to pressure changes of ½" water. Here's accuracy and sensitivity never before thought possible in measuring process pressures—plus the convenience of suppressed ranges at high pressure levels.

THREE IMPORTANT ADVANTAGES:

1. Range spans of 20 and 40 psi available throughout range limits of 35 to 415 psia.

2. Volumetric type pressure system is extremely accurate, practically clog-proof, has corrosion-resistant 316 stainless steel diaphragm.

3. Temperature and barometric compensation for higher accuracy of measurement and control.

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

WE DO THE *spadework..*

THE thorough-going procedures of the field crews, the competency of the party chiefs, and the extensive professional experience of *every* key member of the Independent organization is the foundation on which a long list of oil producers have been building successful geophysical exploration programs for 18 years. The success of your own quest for new oil reserves depends on how well the spadework is done. It will pay you to consult with Independent about your next survey project.

N. N. Zirbel graduated from Rice Institute and started to work with Independent 18 years ago. He went through the mill learning thoroughly the function of every man on a survey party before becoming a party chief. Only men with such extensive training and field background hold posts of responsibility with Independent.

POINTING THE WAY IXC FOR THE DRILL

Independent *Geophysical Surveys*

EXPLORATION COMPANY

1973 WEST GRAY ★ HOUSTON, TEXAS

ESTABLISHED 1932

REPEAT ORDERS

. . . tell the story of Farrel Speed Increasers

There is one very good reason for the many repeat orders which Farrel receives from old customers each year: *No Farrel speed increaser has ever failed on the job.* Every unit installed since 1932, when the SI line was first placed on the market, is still in operation, performing as well as on the day it was placed in service. This "perfect record" provides a virtual guarantee of trouble-free operation.

Send for full information about these service-proved speed increasers. Ask for a copy of Bulletin No. 448A. No cost or obligation.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. *Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Detroit, Chicago, Portland (Oregon), Los Angeles, Salt Lake City, New Orleans

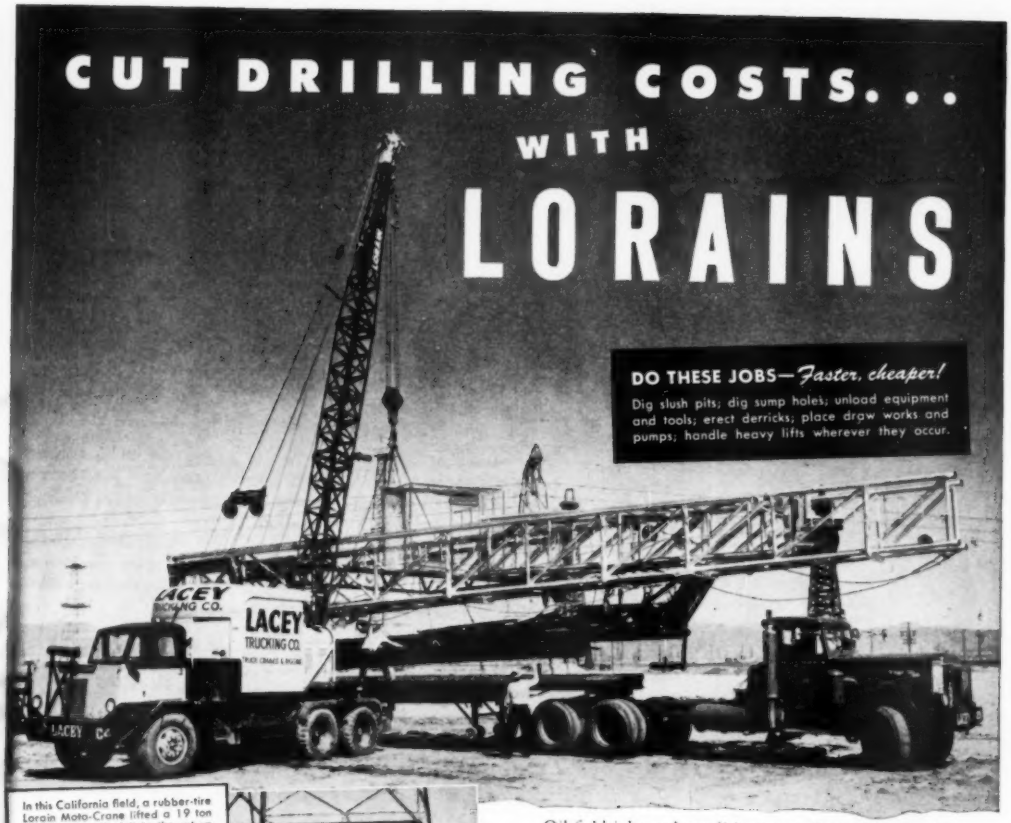
OIL FIELD REPRESENTATIVES: Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa 1, Okla. V. W. Osborne, 860-A M&M Building, Houston 2, Texas

Farrel-Birmingham®

Five speed increasers transmitting 200 HP, with a 10½ to 1 step-up, to high-pressure pipeline centrifugal pumps. This company has ordered sixty similar units since 1932.

FB-665

CUT DRILLING COSTS... WITH LORAINS



DO THESE JOBS—*Faster, cheaper!*

Dig slush pits; dig sump holes; unload equipment and tools; erect derricks; place draw works and pumps; handle heavy lifts wherever they occur.

In this California field, a rubber-tire Lorain Moto-Crane lifted a 19 ton mast, and walked it to the set-up site. Draw works, pumps and tool houses are also handled easily by Lorains.

This view was taken in the Louisiana oil fields where a crawler-mounted Lorain-TL was working as a dragline digging slush pits.

These pictures show but two of the hundreds of jobs and ways on which Lorains are daily serving the Petroleum Industry with cost-cutting, time-saving performance, in field after field.

Oil field jobs and conditions vary. Some jobs require a machine that will float on top of mud and muck; others need a machine that will move around quickly and travel long distances between jobs.

But no matter how conditions vary, all jobs can have the same standard of high efficiency by using a Lorain. You'll find a machine with *everything* you need in the Lorain line of product—a machine of the *proper* capacity for the size of job . . . the *correct* boom for the type of work . . . and the *right* mounting for your ground or travel conditions . . . and every Lorain is loaded down with design and performance features that show up where it counts—in your profit column.

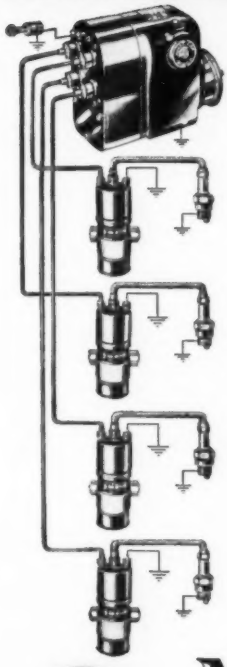
That's why your Thew-Lorain distributor is a good man to know. He can give you the complete Lorain story—can put the *right* machine in the *right* place to do the job *right*. Your name on a Lorain is a good sign your job is making money. Check the Lorain story today!

THE THEW SHOVEL CO., LORAIN, OHIO

THEW Lorain®

SHOVELS • CRANES
CLAMSHELLS • DRAGLINES
HOES • MOTO-CRANES

Free bulletin—"Lorains—Cost Cutters of the Petroleum Industry." A new free booklet showing Lorain's service and savings in the oil field is now available. Send for your free copy—today!



for Large Bore, Stationary Gas Engines

AMERICAN BOSCH

LOW TENSION MAGNETO IGNITION SYSTEM

The System comprises the American Bosch MRB Low Tension, shielded Magneto and individual High Tension Ignition Transformers mounted at each engine cylinder. (See 4 cyl. installation diagram at left). Low tension current, generated in the Magneto, is distributed through low tension leads to the Transformers. Here, the electrical energy is stepped-up to high voltage and conducted to the spark plugs by short cables—shielded if desired. The rugged, heavy-duty, high tension Transformers (as illustrated above) are available with or without shielding for use in the American Bosch System or other low tension systems employing magneto or battery ignition.

Energy losses and corona effects which occur with long high tension cables are eliminated. The possibility of fire and explosion hazard is minimized where engines operate in combustible vapors... radio and TV interference may be greatly reduced by complete shielding. These important advantages, combined with the outstanding electrical and mechanical features of the American Bosch Low Tension Magneto, offer maximum spark efficiency for large bore, stationary engines operating under severest conditions. Write for the facts and we'll show you how you can get this peak performance and safer, continuous service with your present equipment.

American Bosch

MAGNETOS • GENERATORS • VOLTAGE REGULATORS • IGNITION COILS
ELECTRIC WINDSHIELD WIPERS • DIESEL FUEL INJECTION EQUIPMENT

AMERICAN BOSCH CORPORATION • SPRINGFIELD 7 • MASS.

For Top Flight Gas Welding

Choose from AIRCO'S complete line of Oxyacetylene Welding Supplies

Time Proved . . . Job Tested . . . Money Saving

Available from Local Stocks

That's right! Whether you use a popular Airco gas welding rod, flux, or brazing alloy for production or maintenance operations . . . you're certain of top-notch work—ask any one of the thousands of welders who swear by these Airco oxyacetylene welding supplies.

This well-recognized reputation for top performance didn't just happen—more than thirty years' experience and development have gone into the manufacture of these outstanding gas welding supplies . . . know-how that produces high quality, reasonably-priced items that guarantee a job done faster, done better, done easier and done at less net cost.

For further information about Airco's oxyacetylene welding supplies which includes a complete line of rods, fluxes and brazing alloys, write your nearest Airco Office or Authorized Dealer for a free copy of Catalog 12.

More news about AIRCO products

AIRCO No. 1 ALLOY STEEL
A Smooth-Flowing, High Ductile Rod Insuring Good Control of Molten Pool

This rod (AWS Classification GA60) is ideal for welding low carbon and low alloy steels, including pipe of grades A and B analysis. Outstanding among its many important features is the high ductility in the "as welded" condition. Because of its mechanical properties, this rod is desirable when undertaking qualification tests like those included in The American Standards Association Code for Pressure Piping. It is smooth flowing, insuring good control of the molten pool, and, in addition, will withstand considerable heating without burning.

PHOS COPPER
A High Standard Copper And Phosphorous Brazing Alloy

It is self-fluxing when used on copper-to-copper joints but requires a good low melting point flux when brazing brass, bronze or other alloys. It is completely fluid at approximately 1382°F. at which temperature best results are secured and is used in the manufacture of electrical, refrigeration and air conditioning equipment. Available in rod and strip form.

AIRCO MARVEL BRAZING FLUX
A High Quality Flux That Remains Molten And Viscous Over A Wide Temperature Range

It is a uniformly high-quality flux for use in braze welding cast iron, malleable iron, copper and steel and for welding brass, bronze and copper. Marvel Flux remains molten and viscous over a wide temperature range. Its use protects the weld metal from oxidation and effectively reduces or removes oxides and other foreign matter. Marvel Flux is a general purpose flux for the welding shop.

AIR REDUCTION
AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY
AIR REDUCTION PACIFIC COMPANY
REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL
Divisions of Air Reduction Company, Incorporated
Offices in Principal Cities

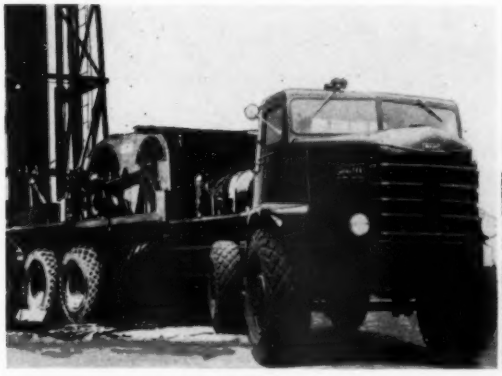
No bogging down or stalling on soft or slippery surfaces!

WALTER 100% TRACTION gets to any location — fast!

WHERE conventional trucks slip and stall on mud, soft dirt, sand, snow or grades—Walter Tractor Trucks continue hauling smoothly and steadily. The Walter Four Point Positive Drive, with automatic locking and torque proportioning differentials, eliminates spinning wheels and provides constantly available tractive power in four driving wheels. All units on this page incorporate the exclusive Walter drive system, plus many other valuable features for oilfield service.

NEW WALTER OILFIELD TRACTOR. Fast, compact, highly mobile carrier for servicing equipment.

Hauls drilling, servicing and exploratory equipment to off-highway locations formerly impossible with wheeled vehicles. Travels 30 to 40 m.p.h. on normal roadways. Heavy-duty 125 h.p. motor; 90 inch wheelbase; large, single 14.00 x 20 tires; 16 inch ground clearance. Exerts 12,000 lbs. tractive effort at 3 m.p.h. Total gross weight of 16,000 lbs. Larger models also available.



WALTER TRACTOR TRUCKS for heavy duty hauling

Powerful, 100% traction, 240 h.p. tractor for trailer-hauling 20 to 25 ton payloads of rigs, pipe or heavy equipment to toughest locations. Combined with properly designed trailers, will haul 70,000-80,000 lb. gross train weights within legal highway axle loading and width limitations. Rugged construction, easy handling and maneuvering.

WALTER FIRE FIGHTER for oil and gasoline fires

A completely self-contained, high-capacity, mobile "fire extinguisher" which discharges a total of 4,800 gal. of fire-sealing Fog-Foam per minute by means of two turret jets, three ground-sweeping jets and three hand-line jets. Accelerates to 45 m.p.h. in one minute—100% traction keeps going through any running conditions.

WALTER MOTOR TRUCK CO., 1001-19 Irving Ave., Ridgewood 27, Queens, L. I., N. Y.

WALTER
4-POINT POSITIVE DRIVE
TRACTOR TRUCKS

See your nearest distributor

EAST
J. F. Brittain
3001 Glenwood Park Ave., Erie, Pa.
Clyde W. Beckner, Inc.
219 Virginia St., W., Charleston, W. Va.
Dow & Company
1820 Elmwood Ave., Syracuse, N. Y.

MONT., WYO., NEW MEXICO
Gamble Equipment Co.
3245 Larimer St., Denver, Colo.

TEXAS
Plains Machinery Co.
P. O. Box 288, Amarillo, Tex.

CALIFORNIA
Edward R. Bacon Co.
17th & Folsom St., San Francisco
Shaw Sales & Service Co.
5100 Anaheim-Telegraph Rd., Los Angeles

ILLINOIS
C. C. Fuller Co.
520 No. Michigan Ave., Chicago, Ill.

OKLAHOMA, ARKANSAS
Diesel Power Company
1801 N.E. 9th St., Oklahoma City, Okla.

LOUISIANA and MISSISSIPPI
Logan Perkins
Int'l Trade Mart, New Orleans, La.

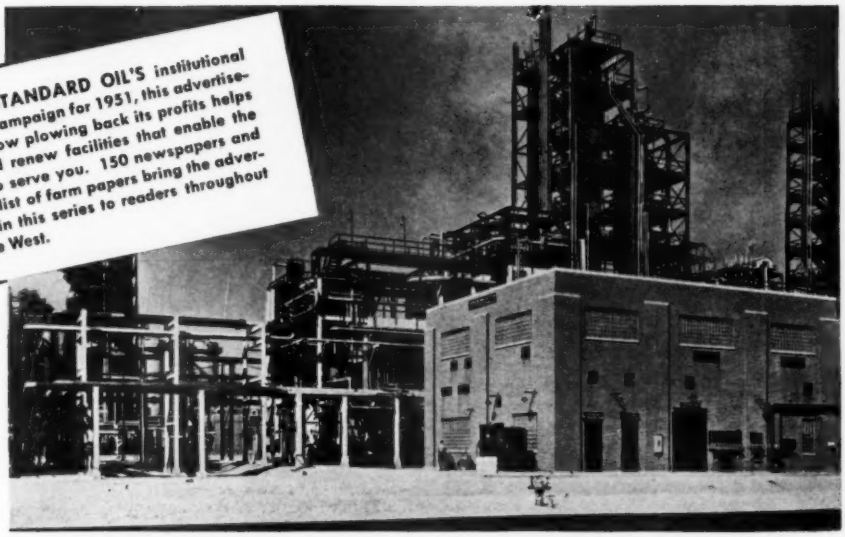
Easy does it—FAST!

Rolling-in ELECTRUNITE Stainless Steel Pressure Tubes at Struthers Wells Corporation, Warren, Pa.

● Always uniform in size . . . always uniformly ductile . . . ELECTRUNITE Stainless Steel Heat Exchanger and Condenser Tubes always roll in smoothly and easily. For complete information about these modern pressure tubes, write to:

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

THIRD IN STANDARD OIL'S institutional advertising campaign for 1951, this advertisement tells how plowing back its profits helps expand and renew facilities that enable the company to serve you. 150 newspapers and a selected list of farm papers bring the advertisements in this series to readers throughout the Middle West.



GIANT REFINERY UNITS like these at our Whiting, Indiana refinery are among the tools of our trade which help Standard Oil employees to earn good wages and enjoy steady work. Our tools are made possible by the investment of our many owners. Last year about two-thirds of our profits were retained in the business to help pay for new equipment and thus increased the book value of the owners' stock.

2/3 of our profits help pay for the new tools our employees use

THE BETTER the tools a man has on his job, the more he can produce—and the more he can earn. Each employee of Standard Oil and its subsidiary companies is backed by an average investment of $31,400 in tools and equipment.

There's an old question, "Which came first—the chicken or the egg?" In our case, modern tools and equipment help us make a profit, but we could not have them unless we made a profit. In recent years, about two-thirds of our profits—the money left after paying all expenses and taxes—have been plowed back into the business to help expand and renew the facilities that enable us to serve you.

The remaining one-third of the profits has gone in the form of dividend payments to those who then held shares of Standard Oil as a return on their investment. Last year's dividends had a value of $3.14 per share of stock.

Because they are good workers and are provided with good tools, our employees earn good wages and have the security of steady work.

Profits benefit our customers, too. Because of profits, new equipment increases the supply of products and improves their quality. That's the customer's "dividend."

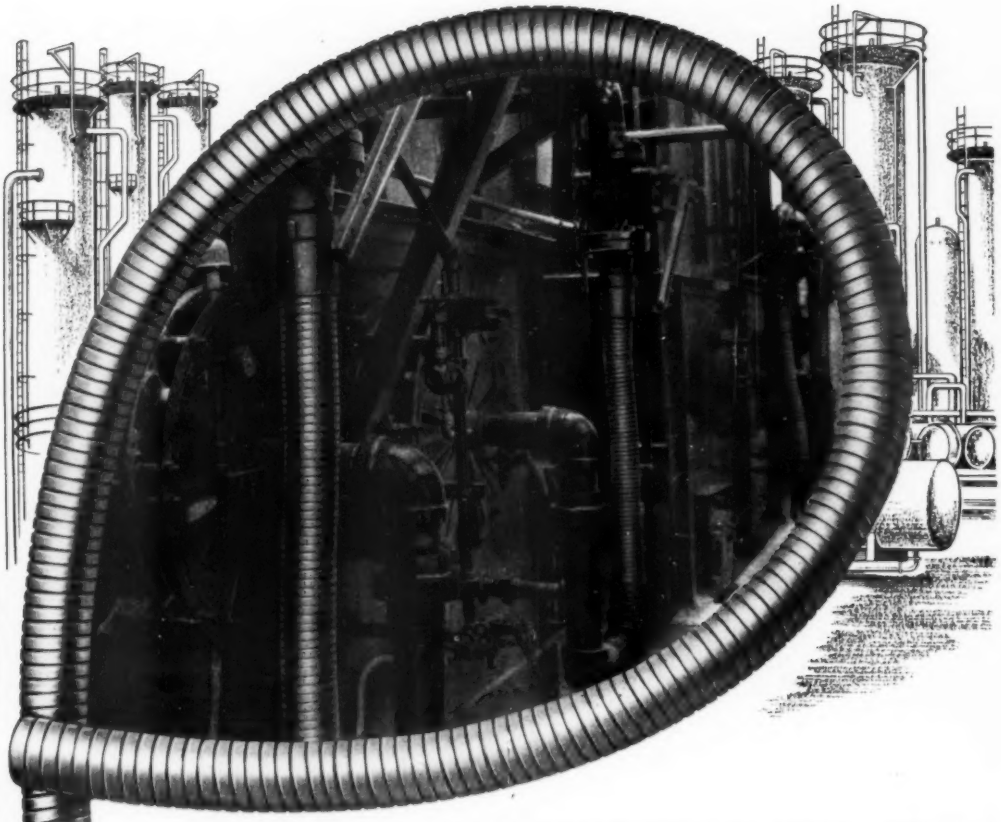
Yes, profits give investors a fair return on their investment. They give employees good earnings, and the security of steady work. And they give you a dependable supply of products at prices so economical that gasoline, for example—compared with most of the things you buy—is an outstanding bargain.

STANDARD OIL COMPANY

HIGH PRODUCTION MEANS good earnings for N. H. James of our Casper, Wyoming refinery and for 46,700 other Standard Oil employees. At our refineries one big reason for high production is our modern catalytic crackers, the largest of which can produce enough gasoline to keep 200,000 automobiles running.

HIGH PRODUCTION MEANS a fair return for Mrs. Alvah P. Clayton of St. Joseph, Missouri, one of the many owners of Standard Oil. No one person owns as much as 1% of our stock. Of the institutional owners, including many educational and charitable organizations, no one owns as much as 4%.

HIGH PRODUCTION MEANS lower prices and better quality for millions of Standard Oil customers like Myrtle Monen of Ft. Dodge, Iowa, a regular customer of Newell H. Fawkes. Gasoline, for example, now sells at about the same price, excluding taxes, as in 1925; on a performance basis it is worth 50% more.



CORRUGATED "MUSCLES" THAT LET PIPES MOVE

PENFLEX METAL HOSE ABSORBS THERMAL EXPANSION . . . PREVENTS JOINT LEAKS

Petroleum still burners like this one in Kermit, Texas, put heavy strains on piping. Thermal expansion, contraction and physical shock make safe sealing of burner pipe joint assemblies a vital requirement.

Penflex flexible metal hose with couplings is used on these burners to absorb any pipe movement due to extreme temperature and pressure changes. Lengths of 4" I.D. interlocking, four-wall galvanized steel hose are installed on each burner. Provides outstanding safety and high, uninterrupted flow of volatile fluids. Leakproof, tough and *flexible*.

Penflex engineers can help you solve flexible tubing application problems. Penflex manufactures a complete line of four-wall, interlocking and seamless welded corrugated tubing . . . from ⅛" I.D. and up . . . automatic barrel fillers, accessories and fittings. Write for illustrated folder, "Flexineering," containing valuable flexible tubing data for your product application.

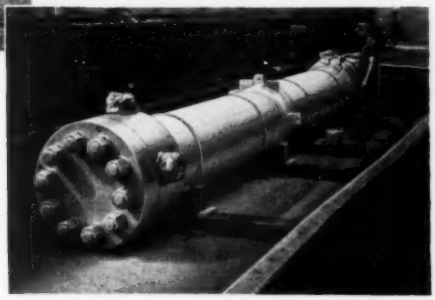
Pennsylvania Flexible Metallic Tubing Company, Inc., 7213 Powers Lane, Phila. 42, Pa.
Branch Sales Offices: **Boston • New York • Chicago • Houston • Cleveland • Los Angeles**

penflex

HEART OF INDUSTRY'S LIFE LINES

One of several MULTI-LAYER Converters designed for 5000 psi working pressure, with corrosion-resistant type 405 alloy inner shell. Wall thickness 8¼ inches, weight 182,000 lb. This type of construction is ideal for high pressure synthesis of coal and shale.

MULTI-LAYER Heat Exchanger designed for 5100 psi working pressure. Wall thickness 4¾ inches, weight 45,800 pounds.



A.O.Smith
MULTI-LAYER
Heat Exchangers & Pressure Vessels

The practical, *economical* solution to your high pressure process and storage requirements

MULTI-LAYER vessels are built-up from concentric layers of relatively thin steel plate, progressively *wrapped, tightened* and *welded* around an inner, pressure-tight cylinder.

Greater range of process possibilities for the planning and design engineer are provided in this unique, patented construction.

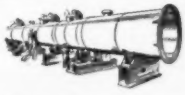
Walls can be made stronger merely by increasing strength of steel wrapping plates or by adding more layers.

For corrosive service, only the inner cylinder need be fabricated of alloy or non-ferrous materials.

No size or weight limitations as MULTI-LAYER vessels or heat exchangers can be made in any diameter for which satisfactory end closures are available.

The full calculated strength of the steel is more fully utilized in MULTI-LAYER vessels. Wrapping tension and weld shrinkage develop compression in the inner layers. This results in more equalized loading of all portions of the vessel wall under working pressure.

Safety is greatly improved by MULTI-LAYER construction. Only the inner cylinder need be pressure tight! Outer layers are provided with vent holes which protect the vessel against damage from over-pressure. In the remote event of run-away overload sufficient to cause failure, there is little danger of fragmentation of the vessel wall, due to the nature of MULTI-LAYER construction.



Consult A. O. Smith for assistance on your heat-exchanger or pressure-vessel problems. In any event, write for Bulletins V-52 and V-53 for more complete information on MULTI-LAYER Pressure Vessels and their construction . . . or use handy coupon.

A.O. Smith 77th ANNIVERSARY 1874 - 1951

A.O.Smith

VESSELS • HEAT EXCHANGERS

Boston 16 • Chicago 4 • Cleveland 15 • Dallas 2 • Denver 2
Houston 2 • Los Angeles 22 • Midland 5, Texas • New Orleans
New York 17 • Philadelphia 3 • Pittsburgh 19 • San Francisco 4 • Seattle 1
Tulsa 3 • Washington 6, D.C. • Milwaukee 1, Wis. • International Division: Box 2023, Milwaukee 1

A. O. Smith Corporation
Dept. OG-551, Milwaukee 1, Wis.

Without obligation, send me Bulletins V-52 and V-53 on your MULTI-LAYER Pressure Vessels and their construction.

Name_____

Firm_____

Street_____

City_____ State_____

Behind Every Regan Product Traditional Regan Quality

"Wrought On the Forge of Experience"

REGAN Forge & Engineering Company was founded in 1905 by Joe and Jim Regan and rapidly became known for pride of workmanship unique in the trade. **REGAN** was first to engineer and manufacture roller bearing crown and traveling blocks as well as many other innovations in oil well drilling equipment. **REGAN** continues to maintain a 46-year reputation for products of exceptional quality and outstanding durability in oil well drilling operations throughout the world. **REGAN** today is under the active direction and supervision of 6 Regan brothers, sons of the Company's founder. **REGAN** assures personal attention to your equipment problems. Complete customer service and satisfaction is Regan's first consideration, always.

1. Mary M. "Mother" Regan
   Secretary
2. Tom Regan
   President and General Manager
3. Joe Regan
   Treasurer and Assistant General Manager
4. Richard "Dick" Regan
   Sales Manager
5. George Regan
   Plant Superintendent
6. Jack Regan
   Field Sales Engineer
7. Louis Regan
   Chief Engineer

Regan

Forge & Engineering Co.

Quality – Wrought on the Forge of Experience

SAN PEDRO, CALIF.
BAKERSFIELD, CALIF.
Exclusive Mid-Continent Representatives:
Hunt Tool Co., P. O. Box 1436, Houston, Texas

HOUSTON, TEXAS
Exclusive Export Representatives:
Hunt Export Co., 19 Rector St., New York, N. Y.
Avda Pte., R. Saenz, Pena 832, Buenos Aires, Argentina

CROWN BLOCKS

TRAVELING BLOCKS

BLOWOUT PREVENTERS

WELL HEAD EQUIPMENT

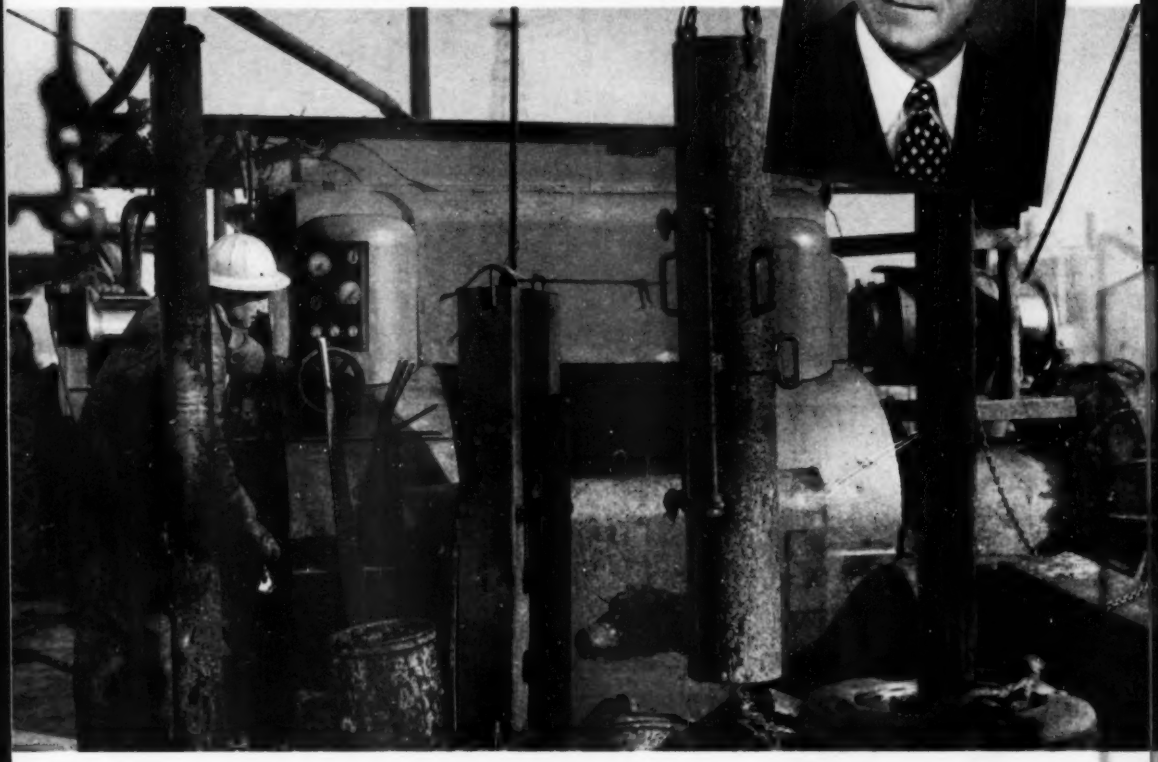
TUBING ELEVATORS

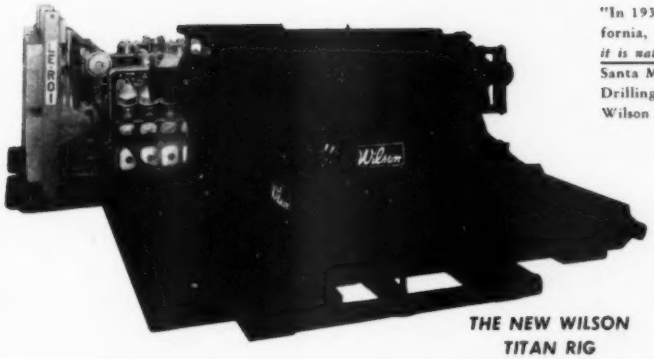
LINE WIPERS

HOOKS

"Wilson ...MY CHOICE SINCE 1937..."

L. H. "CHIEF" MUSOLF
President
SANTA MARIA DRILLING CO.
LONG BEACH, CALIFORNIA





THE NEW WILSON TITAN RIG

"In 1937, I set up the second Wilson Drilling Rig in California, and *having worked with Wilson Rigs* ever since, *it is natural this would be my choice* when starting the Santa Maria Drilling Corporation. Since 1947, Santa Maria Drilling has been operating two Wilson Titans and four Wilson Giant Rigs.

"I wish to emphasize the fact that *these rigs have operated very successfully with minimum upkeep cost. Any further drilling equipment which we may add will definitely be Wilson.*"

One of Santa Maria's Wilson Giant Rigs, in operation for many years, is pictured above. At left is New Wilson Titan Rig complete with all Famous Wilson Features including Full Vision Control and Instrument Panel.

Compare Prices - Compare Quality

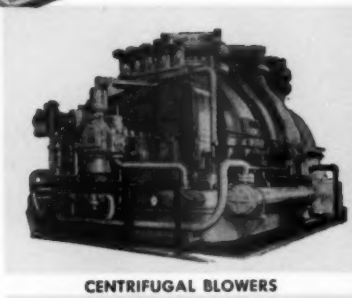
Wilson MANUFACTURING CO., Inc.
WICHITA FALLS, TEXAS

Congratulations

...to one fifty-year

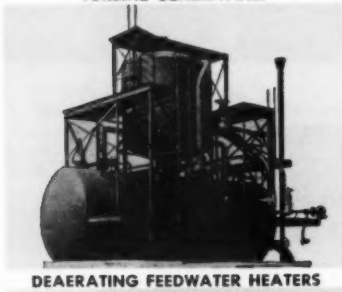
TUBE CLEANERS

TURBINE GENERATORS



CENTRIFUGAL BLOWERS

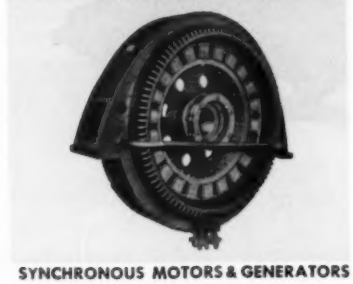
STEAM JET EJECTORS



DEAERATING FEEDWATER HEATERS

TURBOCHARGERS FOR DIESELS

MECHANICAL DRIVE TURBINES



SYNCHRONOUS MOTORS & GENERATORS

EXPLOSION-PROOF MOTORS

veteran from another!

HALF CENTURY OF POWER PROGRESS

1901 1951

Looking back fifty years, Elliott Company, beginning in a very small way as a manufacturer of boiler tube cleaners, at first had only this product to offer the young oil industry. With the appearance of pressure stills, about 1919, Elliott Company was ready to develop the special heavy-duty tube cleaners required for removing hard coke deposits from still tubes and other pipes around the refinery. Since that time, continually improved Elliott-Lagonda tube cleaners have been getting stills back on stream in jig time. Meanwhile an expanding line of steam, electrical and process equipment has included many products which have played their part in the oil industry's march of progress, including those illustrated at left.

Looking ahead, the Elliott Company continues to plan and improve its full line of equipment. Continual engineering development work assures you of being "A Step Ahead With Elliott."

Q-1155

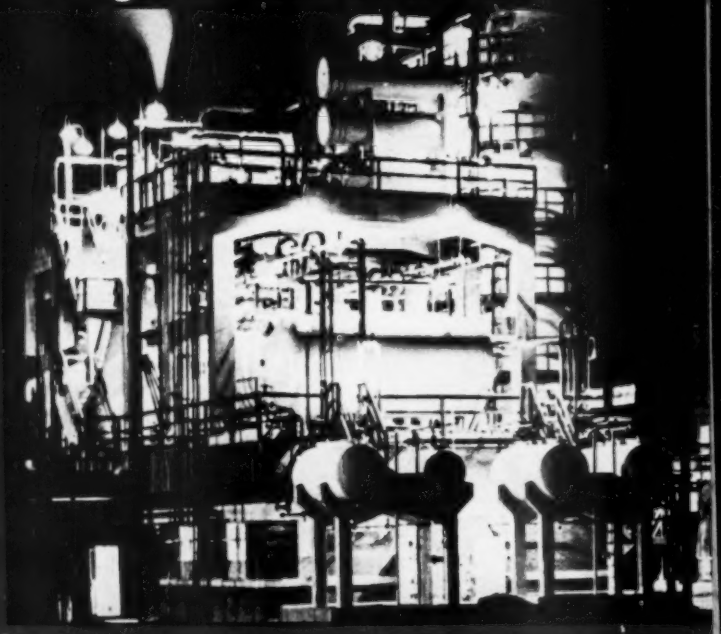
ELLIOTT COMPANY

JEANNETTE, PA.

PLANTS AT: JEANNETTE, PA.
RIDGWAY, PA. • AMPERE, N. J.
SPRINGFIELD, O. • NEWARK, N. J.

District Offices in Principal Cities

Now Blaw-Knox brings its services a thousand miles nearer to the great Southwest



The Tulsa office of the Chemical Plants Division is less than two years old. Yet in that short time its reputation for speedy and economical service has resulted in an increasing volume of engineering and construction contracts. To offer even better service to its customers it has greatly expanded its personnel and moved to larger quarters at 540 E. Fifth Street, Tulsa. No plant is too large or too small to receive the best service Blaw-Knox has to offer, and each phase of the work is carefully supervised by specialists and done in such a way that the project is completed with speed and efficiency . . . for a consultation in your office or ours just phone us at our Tulsa office.

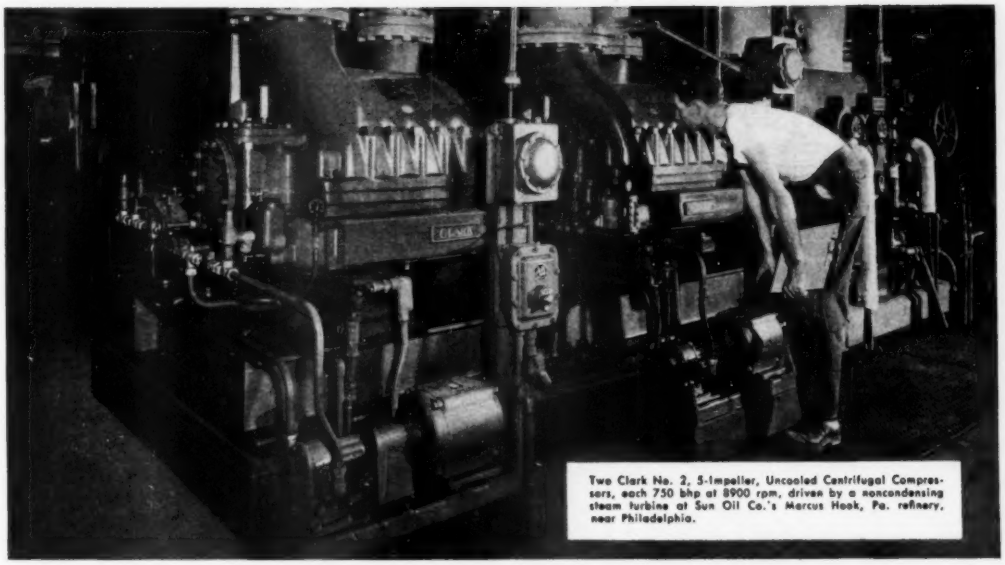
- Gasoline Plants
- Natural Gasoline Stripping Plants
- Compressor Stations
- Dehydration Plants
- Pipe Lines

- Chemicals from Petroleum
- Special Refining Processes
- Heat Exchangers
- Air-cooling Towers
- Gas Cleaning Equipment
- Catalytic Cracking Plants

CHEMICAL PLANTS DIVISION

BLAW-KNOX CONSTRUCTION COMPANY

PITTSBURGH, PENNA. • TULSA, OKLAHOMA



Two Clark No. 2, 5-Impeller, Uncooled Centrifugal Compressors, each 750 bhp at 8900 rpm, driven by a noncondensing steam turbine at Sun Oil Co.'s Marcus Hook, Pa. refinery, near Philadelphia.

UNIQUE APPLICATION BY SUN OIL'S MARCUS HOOK REFINERY

Conserves Energy, Cuts Costs

✓ In feeding air system network
✓ In reducing steam pressure

Wherever steam is available and space is at a premium, Clark Centrifugal Compressors have long been recognized as the ideal source of shop air. *That's a widely known fact!*

But, Sun Oil Company's refinery at Marcus Hook, Pa. had an additional and unique reason for recently installing two of these Clark units: They were most economically suited to the energy-conserving, cost-cutting system, which Sun had engineered, to accomplish in one continuous operation — (1) The feeding of the refinery air system network, and (2) The reduction of large volumes of steam from 400 to 135 psi pressure.

By using a noncondensing steam turbine to drive two Clark No. 2, 750 bhp (each), 5-Impeller, Uncooled Centrifugal Compressors, and simultaneously reduce the steam pressure, Sun has come out far ahead. Available steam is being utilized to economically serve air requirements (the unit compresses 6150 cfm of air from the atmosphere to a discharge pressure of 110 psig). Large losses of energy, inevitable with the use of a reducing valve, and high costs involved in the use of a boiler, have thus been avoided.

To be current on the economy of Clark Centrifugal Compressors for *your* plant, write for literature and consult with your nearest Clark representative.

CLARK
Centrifugal®
COMPRESSORS

SEE the difference in CLARK COMPRESSORS
MIDGET ANGLE • RIGHT ANGLE • BIG ANGLE
ELECTRIC-DRIVEN • CENTRIFUGAL

CLARK BROS. CO., INC.
One of the Dresser Industries
OLEAN, N. Y.

New York • Tulsa • Houston • Chicago • Boston • Washington • Los Angeles • Birmingham • Detroit • Salt Lake City • San Francisco
London • Paris • Varese, Italy • Buenos Aires • Caracas, Venezuela • Lima, Peru • Bogota, Colombia • New Delhi, India

THE PEERLESS TYPE A PUMP

Continuous Duty General Purpose

General Characteristics • **SINGLE STAGE HORIZONTAL SPLIT CASE DESIGN**

DOUBLE & SINGLE SUCTION (Double Suction Sizes 1¼" through 48"; Single Suction Sizes 2" & 3")

BOTTOM SUCTION (Bottom Suction Sizes 12" through 42")

BALL BEARING

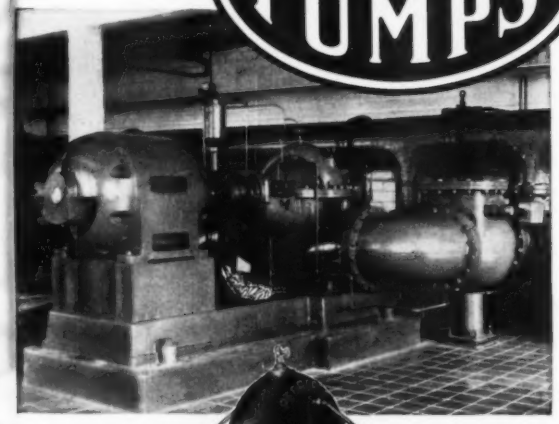
CAPACITIES: Up to 70,000 g.p.m.

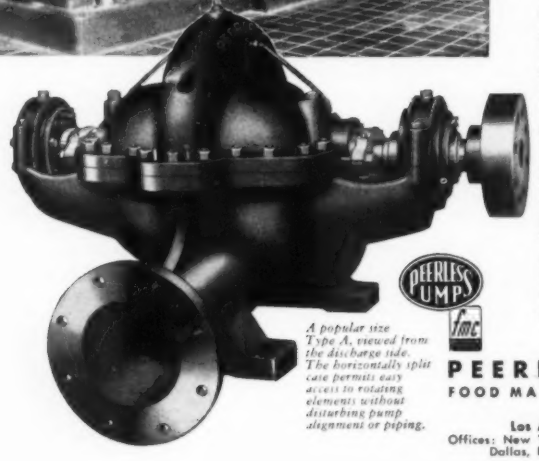
HEADS: Up to 300 feet.

DRIVES: Direct-connected electric motor; belted drives; diesel, natural gas, and gasoline engine; steam turbine; combination drives.

TEMPERATURES: Handles liquids up to 300° F.

PEERLESS PUMPS





A popular size Type A, viewed from the discharge side. The horizontally split case permits easy access to rotating elements without disturbing pump alignment or piping.

TYPE A *for All purpose pumping*

Peerless Type A pumps can be used in the widest variety of general pumping services, handling clear water and light alkaline fluids, where no solids are in suspension. Applications vary from pumping water for cooling engine jacket water, to providing plant water supply.

TYPE A *for Advanced design*

Peerless Type A pumps are of the ball bearing type with horizontally split casings, for ease of inspection and maintenance. All are furnished with double suction impellers except in three small sizes where single suction design is employed. Bottom suction can be furnished in all sizes from 12" through 42".

TYPE A *for All capacities and heads*

Peerless Type A pumps offer users greatest range in capacities, delivering up to 70,000 g.p.m. Type A characteristics permit pumping against heads up to 300 feet. Liquids of temperatures to 300°F. can be safely handled.

TYPE A *for Ample safety factor*

The mechanical design of the Peerless Type A pump is as superior as its hydraulic characteristics. Oversize shafts, heavy duty ball bearings, modern design wear rings and shaft sleeves all contribute to ample protection against wear, afford a high factor of safety in operation and assure reliable service and extended pump life.

TYPE A *for Accuracy in construction*

Careful attention to every detail of design is evident in the Peerless Type A pump. For example, bearing seats are cast and bored integral with the case, assuring permanent alignment. All parts are machined to gauge on an interchangeable part system and are rigidly inspected in process.

TYPE A *for Added service life*

Every Type A pump is fully tested in Peerless' modern hydraulic testing laboratory, which can duplicate the field conditions under which the pump will be used. Experienced Peerless trained engineers located near you are at the service of pump users, architects, contractors, etc., to see that the Type A pump matches or exceeds expectations.

Write for Bulletin B-1300 describing and illustrating Type A pumps in detail.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION

Address inquiries to Factories at:
Los Angeles 31, California and Indianapolis 8, Indiana
Offices: New York, Atlanta, Fresno, Los Angeles, Chicago, St. Louis, Phoenix; Dallas, Plainview and Lubbock, Texas; Albuquerque, New Mexico.

PB's PROTECTOR INSTALLATION METHOD is the FASTEST, SIMPLEST, EASIEST, SAFEST IN THE FIELD

It eliminates breaking joints in a stand to install protectors. New protectors are installed at any joint in the stand, either going in or coming out of the hole.

For full details, call

PB SERVICE BRANCHES

	PHONE
Los Angeles, Calif.	Logan 3246
Rio Vista, Calif.	288W
Bakersfield, Calif.	41276
Ventura, Calif.	Miller 3-3964
Houston, Texas	WA 7196
Alice, Texas	744
Odessa, Texas	3063
Snyder, Texas	1247
Baton Rouge, La.	3-5933
New Iberia, La.	1420
Houma, La.	1689R
Mooringsport, La.	3871
Oklahoma City, Okla.	6-1001
Casper, Wyoming	972
Fairfield, Ill.	522
Great Bend, Kansas	
Alberta, Canada	3-4651

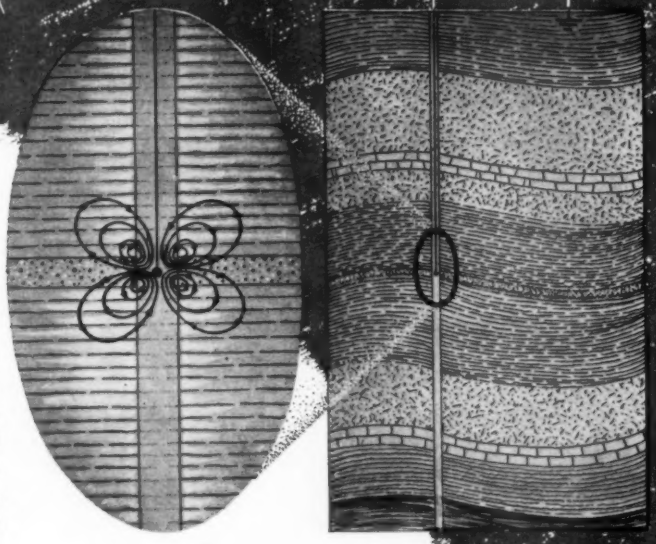
EXPORT REPRESENTATION
Mexico City, Mexico
Buenos Aires, Argentina

PIPE WIPERS · TRAVELING BLOCK BUMPERS · WIRE LINE GUIDES · MUD GUNS · OIL FIELD SPECIALTIES

Patterson-Ballagh
Division of Byron Jackson Co.
MAIN OFFICE: 1900 EAST 65TH STREET
LOS ANGELES 1, CALIFORNIA

PATTERSON-BALLAGH · PATTERSON-BALLAGH · PATTERSON-BALLAGH · PATTERSON-BALLAGH · PATTERSON-BALLAGH

THE SCHLUMBERGER ELECTRICAL LOG



Benjamin Franklin performed a famous experiment 200 years ago, which had a counterpart in the investigations of ground potentials carried on much later by the Schlumbergers. Franklin proved the existence of positive and negative electrical charges by flying a kite in a rainstorm.

This early experiment in the field of natural electrical potentials encouraged other investigators to start and continue work of increasing practical value. The measurement of ground potentials in bore holes by the Schlumbergers was one such important development. The resulting spontaneous potential curve was added to the already existing resistivity curve to complete the fundamental Electrical Log. The development, now only twenty years old, has had an increasing influence on oil exploration and production.

The [illegible] potential [illegible] meable [illegible] rent distr[illegible] above sch[illegible]

SCHLUMBERGER

Schlumberger pioneered the electrical log and has been the unquestioned leader in the field of electrical oil well servicing ever since.

SCHLUMBERGER WELL SURVEYING CORPORATION • HOUSTON

NOW—Simpler, Faster, Automatic Titrations!

Here's another new Beckman advancement in instrumentation—*an instrument that runs your titrations for you.* It's the Beckman Automatic Titrator—the instrument that makes accurate titrations more rapidly and conveniently than by manual methods.

SIMPLE OPERATION: In a series of titrations, simply fill the burette, place the sample in the beaker—and the Beckman Automatic Titrator takes over from there. Raising the beaker holder into position automatically starts the stirrer motor and begins delivering titrating solution into the sample.

A special circuit electrically anticipates the approaching end point, scaling down delivery of the titrating solution in progressively smaller increments to assure a highly accurate titration. When the end point is reached, delivery of the titrating solution stops and a light shows completion of the titration—*all automatically and without attention from the operator.*

Whether your laboratory is large or small the Beckman Automatic Titrator provides important advantages in your titrating operations...

- *It releases the technician during titration, enabling him to perform other operations such as preparing samples, or calculating results.*
- *It eliminates the fatigue caused by close observation required in manual procedures.*
- *It gives objective, reproducible results... eliminates errors due to personal factors.*
- *It provides time-saving conveniences for sample handling.*

PERFORMS A WIDE VARIETY OF TITRATIONS—Neutralization, Oxidation-Reduction, Precipitation, Complex-Formation and other types.

NO SPECIAL TRAINING IS REQUIRED—rapid and accurate titrations can readily be performed without special skill or technique.

QUICK, SIMPLE OPERATION—completes many routine titrations in only 1-1½ minutes—even titrations to 0.1% accuracy in 2½ minutes or less. Change of sample is simple, rapid—a single motion raises, locates and secures new sample in operating position.

CONVENIENT, VERSATILE, ADAPTABLE—0° to 100° C temperature compensation... adjustable holder accommodates 10 ml to 400 ml beakers or similar vessels... instrument may be used with all standard burettes down to 5 ml... as many as four delivery units accommodated by single amplifier control unit.... uses standard Beckman electrodes.... electrode holders and delivery tip can be pivoted into any required position... ample provision for mounting heating devices or other special equipment.

ALSO A RELIABLE pH METER—the Beckman Automatic Titrator can also be used as an AC-powered pH meter to give accurate readings over the range 0 to 14 pH, as well as millivolt readings from −600 to +1400 mv.

For full details on this new Beckman instrument see your authorized Beckman dealer—or write direct. *Beckman Instruments, National Technical Laboratories, South Pasadena 24, California.*

Factory Service Branches:
NEW YORK — CHICAGO — LOS ANGELES

BECKMAN INSTRUMENTS
control modern industries

Beckman Instruments include: pH Meters and Electrodes — Spectrophotometers — Radioactivity Meters — Special Instruments

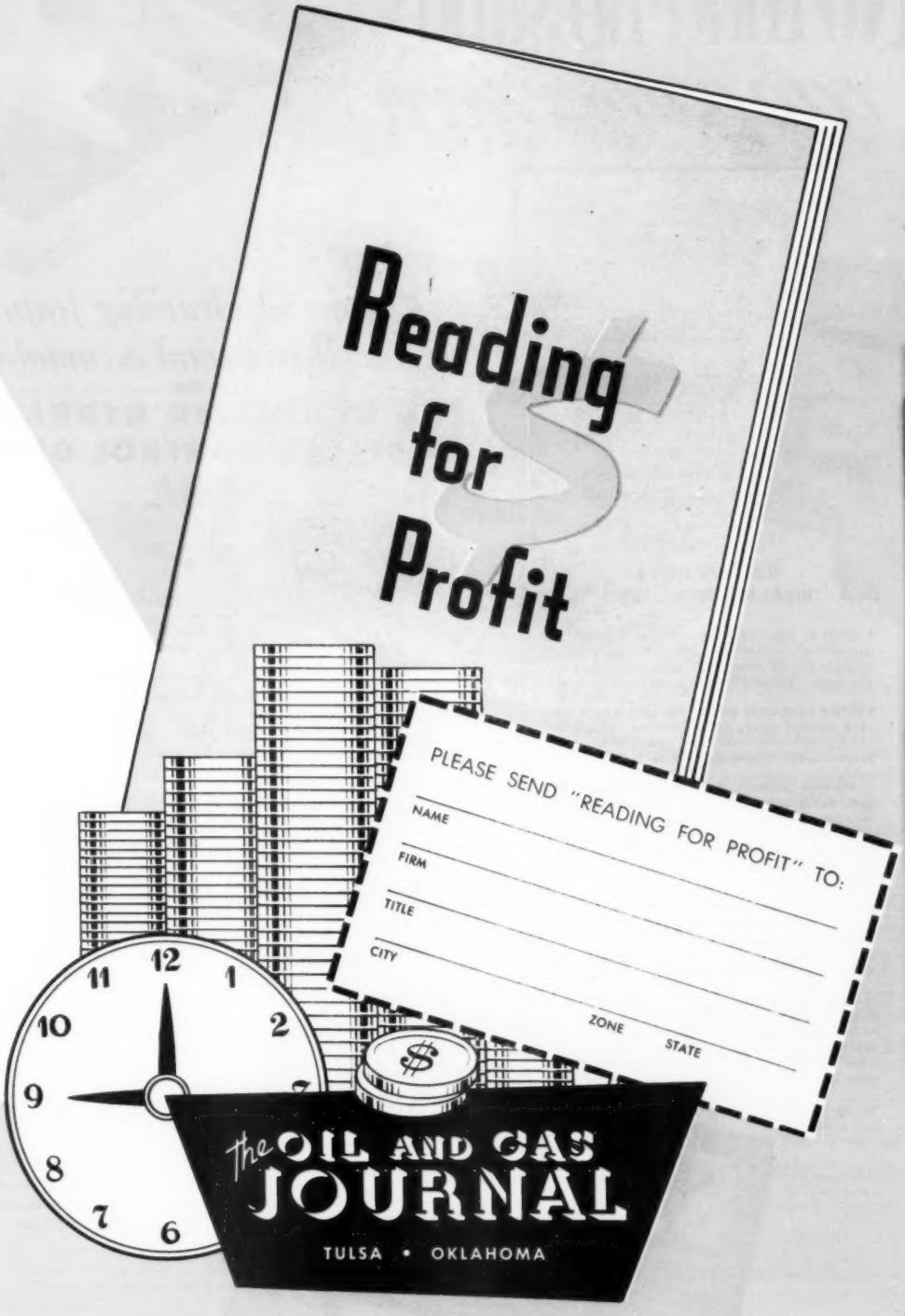
OF TIME AND MONEY

Yes, you can save time and money when you master the technique of reading. You can avoid "spending" time you can't afford, and learn to "invest" time in reading for the same reason you invest your money . . . **profit.**

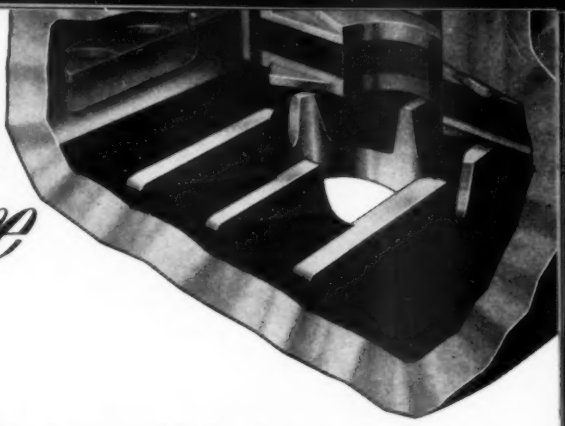
According to trained experts, most business men can increase their reading speed from 20% to 300% in a period of only a few short weeks. Only the minimum increase of 20% would mean one-fifth more learning gained in your lifetime.

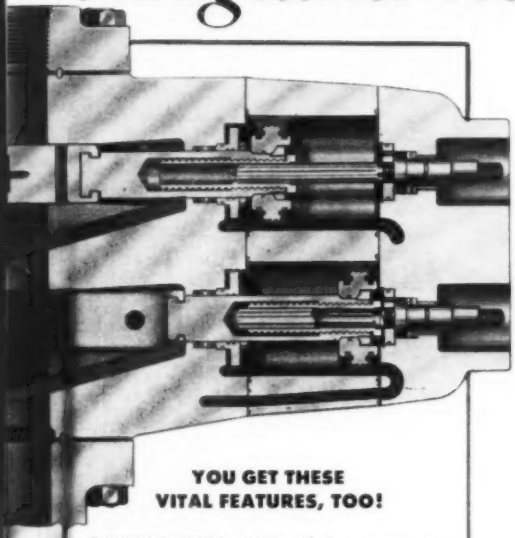
This "Reading for Profit" booklet has been prepared to help you get more from less reading time during your busy day. It costs you nothing . . . can easily be read in five minutes or less . . . yet can mean so much to **you** . . . **your** career . . . **your** business!

Mail the coupon . . . **now!**


Reading for Profit
PLEASE SEND "READING FOR PROFIT" TO:
NAME
FIRM
TITLE
CITY
ZONE
STATE
The OIL AND GAS JOURNAL
TULSA • OKLAHOMA

No mud-no sand *can gather here*

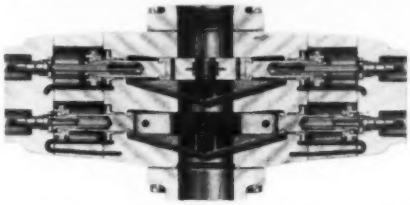




Unique self-draining feature prevents detrimental accumulations

IN THE

NEW SHAFFER HYDRAULIC CELLAR CONTROL GATE



Besides its many other important features, the new Shaffer Hydraulic Cellar Control Gate incorporates an important advantage found in no other hydraulic cellar control gate. Note how the bottoms of each ram compartment are steeply-sloped toward the bore—*with high, narrow ribs upon which the rams travel.*

These ribs are *narrow* so as to reduce to a minimum the surface upon which any mud or sand can gather. And the little that does collect on these ribs is quickly and easily wiped off by the rams as they open or close.

In addition, because these ribs are *high* above the steeply-sloped bottoms of the gate, they hold the rams far above any mud or sand that might collect on the bottoms of the ram compartments.

As further protection, note how the bottoms have a steep inward pitch that quickly drains mud and sand back into the well as quickly as it settles. With this three-way protection against detrimental mud and sand, the rams are *always* ready for use whenever pressure emergencies threaten!

Then remember this—mud-free design is only one of *many* far-reaching advancements built into the new Shaffer Hydraulic Cellar Control Gates. Check over some of the others outlined at left. No other equipment provides so *much* protection—in so *small* a space—with so *many* operating advantages!

YOU GET THESE VITAL FEATURES, TOO!

▶ UNUSUAL COMPACTNESS—with *two* separate ram compartments unitized into *one* body having an over-all height of only 30 inches even in sizes as large as 13⅝" (12" Series 900). *Smaller sizes are even more compact!*

▶ DIRECT HYDRAULIC DRIVE—with the hydraulic operating cylinders *directly behind* each ram. For simplicity and maximum safety there are no secondary connections between hydraulic cylinders and rams!

▶ FAST RAM CHANGES—the simplest and fastest in any gate. Merely unbolt and swing open two side doors, slide out the ram assembly, change the ram blocks and rubbers, slide the assembly back in, close and bolt the doors—and the job is done. *Moreover, complete ram changes can be made whether pipe is in or out of the hole!*

▶ FULLY ENCLOSED DESIGN—with all moving parts enclosed and no moving parts on the outside to become wedged or damaged by objects falling into the cellar—or become corroded by chemical and salt drippings. Even the locking shaft is non-rising and fully protected!

These and still other vital advantages make the new Shaffer Hydraulic Cellar Control Gate *the* outstanding hydraulic gate available today. Before you buy *any* control gate equipment, be sure to get the *complete* story from your nearby Shaffer representative. Or write direct!

Send for your free copy of the complete Shaffer Catalog.

See pages 4433 to 4496 of the 1950 Composite Catalog.

SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

SHAFFER TOOL WORKS, Brea, California • California Service Shops: Santa Fe Springs and Taft
HOUSTON, TEXAS, 6006 Navigation Blvd. • ODESSA, TEXAS, 1925 West Second Street
OKLAHOMA CITY, OKLAHOMA, Acme Oil Tool Company, 1001 S. E. 29th Street
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 1788
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

28 years OF OIL TOOL LEADERSHIP

They Say—

Controlling Pollution

"One reason for the improvement of fishing in Ohio is the steps being taken to clean up the state's waterways. In the industrial side of anti-pollution work, Sohio has been hailed as a leader by no less an authority than the Ohio Conservation Congress.

"Not generally known is the fact that Sohio's technical service division has five people assigned to the full-time task of studying and solving pollution problems. They work co-operatively with state and local officials.

"During the past year alone Sohio completed new oil and water separation facilities costing over a million dollars at its Cleveland refineries. Construction was also started on improved waste disposal equipment at Lima. In 1948 a modern installation was constructed at Latonia refinery to improve the condition of Bank Lick Creek."

The Sohioan, Standard Oil Co. of Ohio.

No Slowdown Indicated

"We should now turn our attention to preparing for the future (natural gas) market development and demands which are facing us now in our present service areas and which will become increasingly greater and more urgent from year to year to come.

"Preparation for those demands will involve securing additional sources of gas supply, increasing and expanding our existing transmission facilities, and providing means for meeting peak winter loads through underground storage.

"Those three activities will keep us busy for some time to come—certainly long enough to assure our continued appraisal as a growth industry."

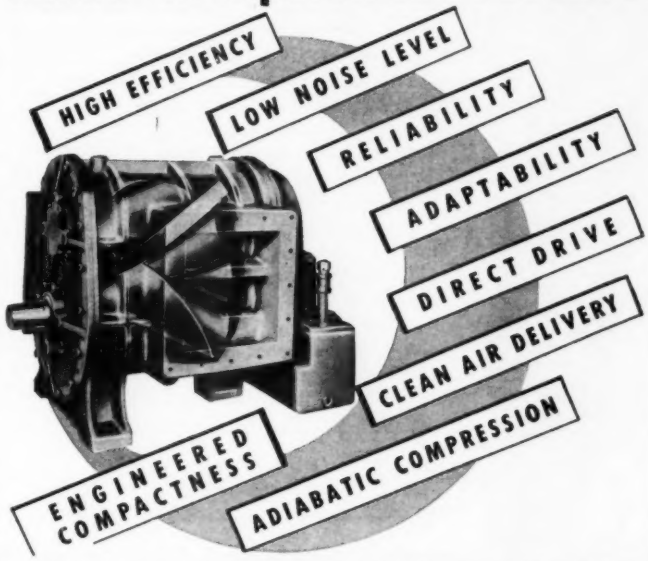
R. H. Hargrove, president, Texas Eastern Transmission Corp., addressing the eastern Pennsylvania group of Investment Bankers Association of America in Philadelphia.

Hindrance to Progress

"In spite of its merit, pressure-maintenance through gas injection or water injection is not as extensively used as it might well be. The substantial reason is that to accomplish pressure-maintenance on a field-wide basis requires the cooperative management of a common source of supply.

"Too many situations exist where one owner is unwilling to join with all the others to utilize the improved operating practice. In the absence of

The STANDARDAIRE BLOWER offers these exceptional features



WHETHER you require 20 cfm or 15,000 cfm capacity blowers these features are inherent in the unique design of the modern Standardaire positive displacement blower. Its epicycloidal rotor form acting as an air screw is unlike that used in the conventional lobe type unit—and Standardaire blowers have demonstrated their all-around superior performance to the satisfaction of many leading industrial users.

Send today for complete information. If you have specific requirements our engineers will welcome the opportunity to work with you. Write Dept. E52, READ STANDARD CORPORATION, 370 Lexington Ave., New York 17, N. Y.

Do you have the 1951 STANDARDAIRE Selection Chart?

BLOWER-STOKER DIVISION

FORMERLY The Standard Stoker Co., Inc. ONLY THE NAME IS CHANGED

READ STANDARD CORPORATION

NEW YORK • CHICAGO • ERIE • YORK • LOS ANGELES

USE AIR *instead of liquids* FOR COOLING

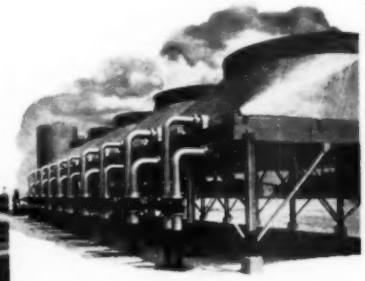
While the principle of air-cooling in heat exchangers is not new, its adaptation on a large scale in industry is being recognized more and more. Air as a coolant can be used under certain conditions with greater economy and higher efficiency than is practical with liquids.

The advantages of air-cooling are readily recognized in cases where ample water supply is not available, where such water may cause scale or premature corrosion, or where treatment required for the water would prove expensive. Many more advantages will suggest themselves.

One of the major components in all air-cooled heat exchangers is, of course, the tubing. And the tubing that deserves serious consideration in such applications naturally is Wolverine Trufin* (the integral finned tube)—and specifically the bi-metal Trufin. This tube has aluminum fins and copper liner, which latter can be supplied in most copper base alloy specified to accommodate the contacting fluids. Obviously, such factors as corrosion, pressure, etc. determine the type of liner and composition of the tube that would prove most efficient.

Since the fins of Trufin are integral with the outer tube itself, they stand upright and remain in a fixed position. Moreover, because there is a good mechanical bond between the two metals, very little loss of efficiency is experienced regardless of the type of liner.

There is much specialized experience here at Wolverine upon which you are invited to draw for help in solving problems involving heat exchangers.



Shown here are two views of an air-cooled heat exchanger installed in the south by Hudson Engineering Co. Nearly a quarter-million square feet of surface area is represented in the installation of Wolverine Trufin—the integral finned tube. This bi-metal Trufin was specifically developed for this air-cooling application and is the direct result of the study of conditions found there by Wolverine's Customer Engineering Service.

*Reg. U. S. Pat. Off.

WOLVERINE TUBE DIVISION
Calumet & Hecla Consolidated Copper Company
INCORPORATED
Manufacturers of seamless, non-ferrous tubing
1459 CENTRAL AVENUE • DETROIT 9, MICH.

Wolverine Condenser Tubes stocked by Butler Industries, Inc., 355 South Fourth Street, Beaumont, Texas • Tel: Beaumont 5-2351.

Wolverine Trufin and the Wolverine Spun End Process available in Canada through the Unifin Tube Co., London, Ontario.

PLANTS IN DETROIT AND DECATUR, ALA.
Sales Offices in Principal Cities
Export Department: 13 E. 40th St., New York 16, N. Y.

total cooperation by all parties, pressure-maintenance operations cannot be engaged in. Unless every lease joins in such projects, the others cannot go forward by reason of the fact that the pressure-maintenance operation on only a part of the pool will lead to migration of oil and gain by the noncooperators at the expense of those who are willing to maintain the reservoir pressure.

"No one can afford to give his lands over to pressure maintenance if a neighbor will benefit by migration and, in addition, not share in the expense of investment or operation required to gain the additional oil."

H. H. Kaveler, Phillips Petroleum Co., addressing North Texas Oil and Gas Association, Wichita Falls.

Ready for Anything

"The (gas) industry is ready to meet any demands placed upon it. There is plenty of gas for all defense demands; there is plenty of gas for all civilian needs."

Carl H. Horne, Alabama Gas Corp., addressing Southern Gas Association, Biloxi.

Contrary Product

"I'm glad I didn't try to hedge against general inflation by buying a billion dollars worth of gasoline in 1925.

"It sells for less these days than it did in 1925.

"I could have made money by buying up almost any other commodity in 1925 and salting it away and selling it at today's prices—from collar buttons to canned tomatoes. But not gasoline.

"Leaving off taxes, the average price of a gallon of so-called "regular" gasoline in 1925 was 21.93 cents. On July 1, 1950, it was 20.17 cents.

"In this same span of time, general living costs went up 37.5 per cent, food up 58 per cent, apparel up 51 per cent, house furnishings up 53 per cent."

Kansas Oil Men's Association Bulletin.

CALENDAR

May

Intermountain Association of Petroleum Geologists, second annual field conference, Canyon, House, and Confusion range areas of Millard County, Utah; headquarters, Forrest Hotel, Nephi, Utah; May 23-26.

Society of Exploration Geophysicists, regional meeting, Rice Hotel, Houston, May 25.

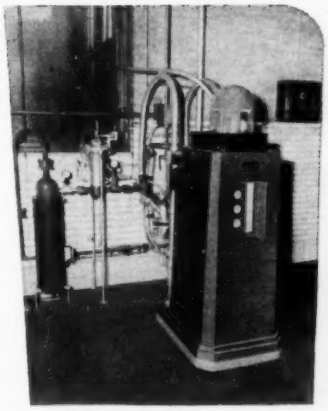
Second annual John Zink Process Heating Seminar, John Zink Co., 4401 South Peoria, Avenue, Tulsa, May 26.

American Petroleum Institute, Division of Marketing, midyear meeting, Cincinnati, May 28-29.

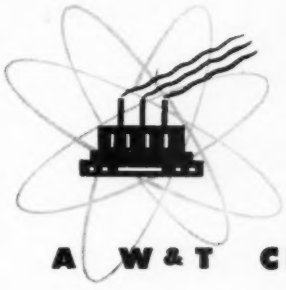
Third World Petroleum Congress, Kurhaus, Scheveningen, the Netherlands, May 28-June 6.

American Petroleum Institute, standardization and standing committees, Division of

SAXTON'S SECRET WEAPON . . .



W&T Chlorinator Installation at Saxton Station



A W&T CHLORINATOR

In winning their battle against condenser slime at the Saxton Generating Station, Pennsylvania Electric Company, in their company publication, called the Wallace & Tiernan Chlorinator their "Secret Weapon."

Here's what happened before chlorine was tried. Experience showed even a small accumulation of slime caused a one inch loss in condenser vacuum — equivalent to a five to ten per cent reduction in plant efficiency. Frequent mechanical cleaning — expensive and disagreeable — still left a thin layer of slime. Cleaning compounds involving acids and alkalis were found an unsatisfactory answer to the problem.

Then Chlorine was tried! Preliminary tests indicated that coal consumption could be decreased by about $75 per day. *But*, feeding chlorine without special equipment proved both expensive and dangerous. A slight variation in feed rates resulted either in insufficient treatment or excessive chemical costs.

As a result of these tests, a Wallace & Tiernan Automatic Chlorinator was installed at Saxton in May 1949. This precision chlorinator made possible reduced coal consumption and virtual elimination of mechanical tube cleaning — the reasons why a W&T Chlorinator is Saxton's "Secret Weapon."

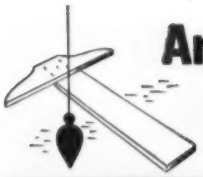
Hundreds of power plants have had benefits similar to those at the Saxton Station. Your W&T Engineer is prepared to help solve your slime problems — why not write for more information today — no obligation, of course.

CD-36

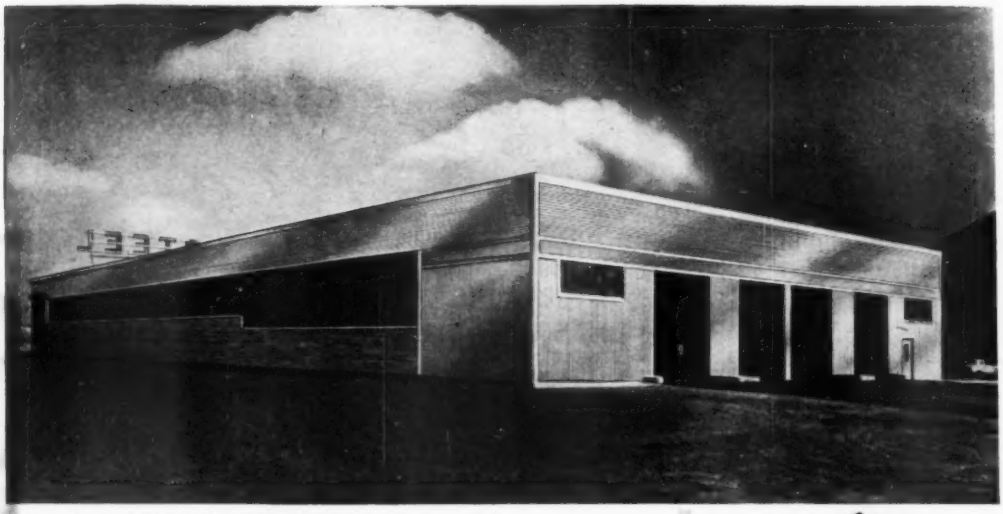
WALLACE & TIERNAN PRODUCTS, INC.

CHLORINE AND CHEMICAL CONTROL EQUIPMENT

Belleville 9, New Jersey • Represented in Principal Cities



Architect-Engineer's choice for Beauty, Long Life, Low Maintenance



New warehouse—Ward Steel Co., North Cambridge, Mass.

When the Ward Steel Company of North Cambridge, Mass., undertook to build the most modern steel warehouse in New England, they called on Waghorne-Brown as designers and engineers. Waghorne-Brown specified rustproof, corrosion-resistant Reynolds *Lifetime* Aluminum Industrial Corrugated for siding. Their reasons were: appearance, long life, low initial cost and low maintenance (no painting)... plus great strength combined with light weight that saves money on framing (see specifications).

Aluminum's radiant heat reflectivity was another deciding factor. On walls or roof, it reduces inside summer temperatures and cuts winter fuel bills. An interesting detail in this building is the contrasting horizontal and vertical application, with aluminum corners and edging. For technical assistance and application details, call any Reynolds Office. Literature on request.

• Offices in principal cities... check your classified phone book for our Building Products listing, or write Reynolds Metals Company, Building Products Division, 2005 South Ninth St., Louisville 1, Ky.

Aluminum is required for planes and other military needs. Reynolds *Lifetime* Aluminum Industrial Corrugated is still produced, but the total supply is necessarily reduced. DO-rated orders receive priority handling.

Specifications for Reynolds *Lifetime* Aluminum Industrial Corrugated:

Thickness .032"
Corrugations 7/8" deep, 2-2/3" crown to crown
Uniform load support (roof) 80 p.s.f. on 4' purlin spacing
Uniform wind load capacity (siding) 20 p.s.f. on girt spacings up to 7'9"
Roofing width 35", coverage 32"
Siding width 33-3/4", coverage 32"
Lengths 5', 6', 7', 8', 9', 10', 11', 12'

REYNOLDS aluminum

REYNOLDS *Lifetime* ALUMINUM INDUSTRIAL CORRUGATED

Production, midyear meeting, Brown Palace Hotel, Denver, May 28-June 1.

Institution of Gas Engineers, London, England, May 29-June 1.

Sixth Annual Short Course in Gas Technology, sponsored by Southern Gas Association, Texas College of Arts and Industries, Kingsville, Tex., May 30-June 1.

Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont., May 31-June 1.

June

Society of Automotive Engineers, Inc., summer meeting, French Lick Springs Hotel, French Lick, Ind., June 3-8.

New York Oil Heating Association, Inc., Hotel Statler, New York, June 4.

National Oil Scouts and Landmen's Association, annual convention, Hotel Beaumont, Beaumont, Tex., June 7-9.

Rocky Mountain Oil and Gas Association, midyear meeting, Henning Hotel, Casper, Wyo., June 8-9.

Liquefied Petroleum Gas Association, Inc., first annual Mountain States district convention and trade show, Troutdale-in-the-Pines, Evergreen, Colo., June 10-12.

American Society of Mechanical Engineers, semiannual meeting, Toronto, Ont., Canada, June 11-15.

Pennsylvania Grade Crude Oil Association, 1951 annual meeting, Hotel William Penn, Pittsburgh, June 14-15.

Canadian Gas Association, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

Petroleum Equipment Suppliers Association, annual meeting, Chateau Frontenac, Quebec, Canada, June 17-20.

American Society for Testing Materials, annual meeting, Atlantic City, N. J., June 18-22.

Kentucky Oil and Gas Association, annual meeting, Ventura and Henry Clay hotels, Ashland, Ky., June 21-22.

American Institute of Electrical Engineers, summer general meeting, Royal York Hotel, Toronto, June 25-29.

July

Wyoming Geological Association, sixth annual field conference, Rawlins, Wyo., July 31-August 3.

August

Society of Automotive Engineers, Inc., West Coast meeting, Olympic Hotel, Seattle, August 13-15.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.

September

American Chemical Society, 120th national Diamond Jubilee meeting, Hotel Statler, New York City, September 3-7.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 4-6.

Michigan Petroleum Association, annual fall convention, Ramona Park Hotel, Harbor Springs, Mich., September 6-7.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, New York City, September 8-9.

New York Oil Heating Association, Inc., Hotel Statler, New York City, September 10.

International Congress of Pure and Applied Chemistry, twelfth conference, Hotel Statler, New York City, September 10-13.

Instrument Society of America, Coliseum, Houston, September 10-14.

American Society of Mechanical Engineers, Industrial Instrument and Regulators division, Coliseum, Houston, September 10-14.

National Petroleum Association, Hotel Traymore, Atlantic City, September 12-14.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 21-23.

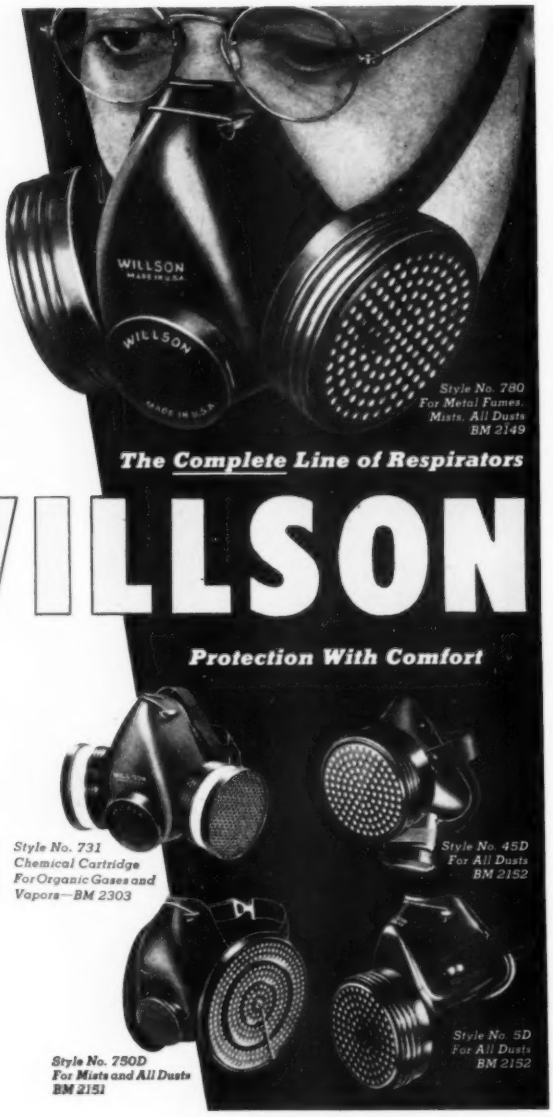
American Society of Mechanical Engineers, sixth petroleum mechanical-engineering conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engi-

Preferred power for garden tractors and a wide range of other agricultural equipment — the world's most widely used single-cylinder gasoline engines on machines and tools for industry, construction, railroads, oil fields, etc., and on appliances and equipment for farm and home.

"PREFERRED POWER" for home, farm, and industrial equipment — powered by gasoline engines. Briggs & Stratton Corporation, Milwaukee 1, U.S.A.

In the automotive field Briggs & Stratton is the recognized leader and world's largest producer of locks, keys and related equipment.



WILLSON®
Dependable Products Since 1870
®T.M. Reg. U.S. Pat. Off.

Here is the most complete line of Bureau of Mines approved respiratory protective equipment. It includes filter and cartridge type respirators which are effective against all dusts, mists, fumes and low concentrations of organic vapors. Ease of breathing and comfortable fit assure a low fatigue factor. Choose exactly what you need from selector tables in our new catalog. Get a copy from your nearest WILLSON distributor or write direct to WILLSON PRODUCTS, INC., 204 Washington St., Reading, Pa.

neers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

October

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.

California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.

Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition, American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.

National Association of Corrosion Engineers, South Central Region, annual meeting, Corpus Christi, Tex., October 18-20.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland, Cleveland, October 22-26.

Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.

Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.

November

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

December

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

New York Oil Heating Association, Inc., Hotel Statler, New York City, December 10.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

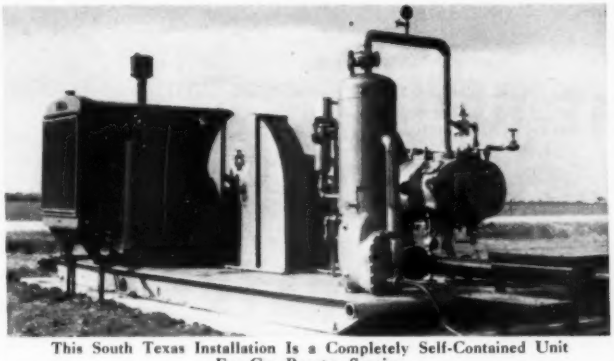
Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, first Monday of each month, Louis Sherry's, 300 Park Ave.

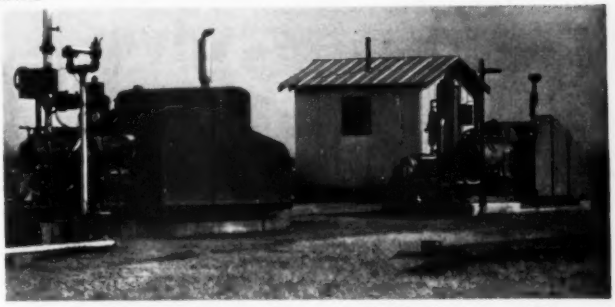
That's RIGHT, They're *Knight*

GAS BOOSTER UNITS



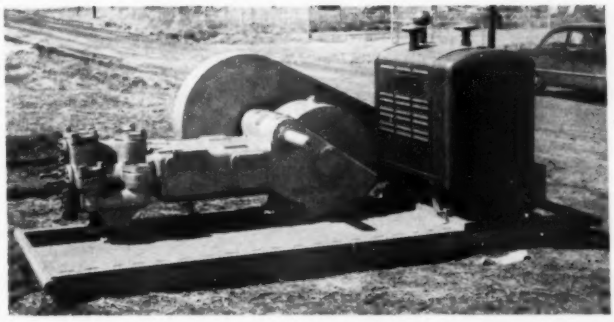
This South Texas Installation Is a Completely Self-Contained Unit For Gas Booster Service

- Capacity and Performance of Permanent Installation
- Safe, Continuous Operation without Constant Supervision
- Quick Installation
- Automatic Safety Features
- Outside or Inside Installation
- Replacement Parts Readily Available
- Skid Mounted . . . Complete Assembly
- Long Life



The unit shown above (left) was the very first Knight Gas Booster Unit ever built. The operators just bought their second Knight unit (above right)

and *Knight* PUMPING UNITS



For

- PIPE LINE SERVICE
- WATER SERVICE
- RECIRCULATING
- MUD MIXING
- SALT WATER
- CEMENTING

CONTACT YOUR FAVORITE SUPPLY STORE

Knight Mfg. & Supply Co.

5732 East Admiral Place TULSA, OKLAHOMA Phone 8-3304—P. O. Box 3265

EQUIPMENT AND SUPPLIES FOR INDUSTRY . . . OIL . . . MINING . . . CONSTRUCTION

NOW!

THE NEW

LANE WELLS

TECHNICAL OILFIELD SERVICES

A-2 BULLET PERFORATOR

gives

28% to 47%

GREATER PENETRATION

Proved by Months of Tests and Field Trials!

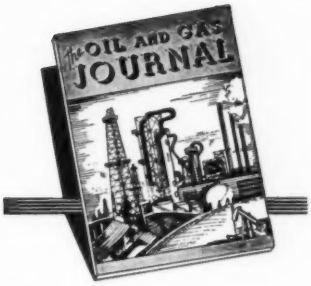
Tomorrow's Tools—Today!

AG-408

ASK YOUR LANE-WELLS MAN

General Offices, Export Office and Plant • 5610 So. Soto St. Los Angeles 58, California

Los Angeles • Houston • Oklahoma City
Lane-Wells Canadian Co. in Canada
Petro-Tech Service Co. in Venezuela



Published every Thursday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Okla. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

P. C. LAUINGER
President

S. H. ROURKE
Executive Vice President

HANSON B. PIGMAN
Circulation Manager

ADVERTISING
MITCHELL TUCKER
Vice President

New York Office
415 Lexington, Phone Murray Hill 2-4852
CHARLES A. WARDLEY
Eastern Manager
ROBERT N. CAIRD, JR
Representative

Chicago Office
168 West Madison, Phone Central 6-2537
C. R. FARMER
Manager
E. S. KLAPPENBACH
Representative

Pittsburgh Office
429 Fourth Ave., Phone Atlantic 1-4835
ALFRED M. JONES
Manager

Tulsa Office
211 S. Cheyenne, Phone 3-6291
JOHN D. REILLY
Mid-Continent Manager
J. PARKER HOLLAND
Production Manager

Houston Office
Sterling Building, Phone Charter 4626
JOHN M. SPEARS
Gulf Coast Representative

Los Angeles Office
450 S. Grand Ave., Phone Vandike 0722
DONALD O. HANSON
Manager

England Office
111 Thorley Lane, Timperley, Cheshire
HARRY BECKER
European Representative
Phone Ringway 4702

Subscription rate to the petroleum industry, United States and foreign, 1 year, $3.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1951 by The Petroleum Publishing Co

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY Speaking

We Write History

AS we warned you a couple of weeks ago, your next issue of our favorite oil publication will be accompanied by a separate book, legally styled a supplement to our May 31 issue. You may not recognize the mailing at first glance, because the two books will be enclosed in a big cardboard carton.

This is our birthday book, our Golden Anniversary Issue. Around our shop the name was irreverently contracted to "Annie," but the official title is "Fifty Years of Oil in the Southwest."

Several histories have been written about the oil industry, but we think there has never been one just like this. We had the feeling that most historians are apt to get kind of bogged down in details which are doubtless quite important for a complete account but which make it a bit difficult for the busy reader to get a quick picture of the running course of history.

So in this book we deliberately skipped a lot of details and attempted to hit the high spots in order to emphasize the significance of the vitally important happenings and to point up how one event led into an ensuing development. This may annoy some old timers who find we have dealt lightly or not at all with something in which they had a hand, but this history was written for the operating oil man of today.

The average oil man is relatively young and has had a pretty active business life, so the chances are he isn't too well versed in what his predecessors did. However, there is a real value in history, and that is its guide to the future. The kind of oil business we have today—the kind of laws, equipment, and men—was not always this way nor did it just happen. It developed the hard way, by trial and error and the rubbing together of many forces and ideas.

Out of what went before we can understand how we got the way we are and what we have to do if we are to have a future. So we tried to write our history with this in view. It's a history by oil reporters, not historians, and even though it's a bit out of our regular line we're rather proud of it and we hope it will be useful.

We Make History

IF you think we sometimes use irreverent nicknames for The Oil and Gas Journal, you should have seen what the Journal's first editor called it more than 40 years ago.

This man, the late Holly Reavis, had an irrepressible wit and refused to take himself too seriously—a saving grace for any editor. In his editorials he habitually referred to the publication as "The One and Only," "The Old Rag," "The Great Enlightener," and similar terms of endearment, deprecation, and exaggeration.

But it was the readers themselves who long ago christened it "The Oil Man's Bible," and with justification. In the early days there were no regular and reliable sources of facts, figures, and information about the fast-growing oil industry except the Journal, and the Journal early established a reputation for supplying this need.

Without the oil industry there could have been no Journal, and we like to think that without the Journal, maybe, the oil industry wouldn't be what it is today. At least in going through the musty files of the Journal for half a century we found that we seemed to be ahead of the industry almost all of the time, constantly urging the industry to adopt practices which were novel at the time but which later became commonplace.

We got so puffed up over our forward-looking attitude through the years that we wrote quite a piece about it, and made it one of the main chapters of our "Golden Annie" birthday book. But this isn't a lot of bragging about how good we are—we admit a few mistakes along the line—nor is it just a history of our favorite oil publication.

Our own history is so closely interwoven with the history of the oil industry that we couldn't tell one without the other. So a review of the Journal is actually a review of the industry. The things the Journal was writing about were the things the industry was worrying about, and the things the industry was doing were recorded in the Journal's pages. In this way we helped make history.

Henry D. Ralph.

Successful Performance

IN THOUSANDS OF WELLS—

● It takes a star to come through in the clutches, and the record shows that Oil Men rely on 'Starcor' for deep-well cementing jobs where the going is toughest. A cement has to be good to hang up a record like 'Starcor's—a record of uniformly successful performance in thousands of wells in the nation's principal oil fields ever since 1936.

'Starcor'*, one of three great Lone Star Cements—made by a quality-minded organization which carries on a continuing program of oil-well cement research—to give the Oil Man what he wants, when he wants it.

*Reg. U. S. Pat Off

SELECT CEMENT TO FIT THE JOB

LONE STAR CEMENT CORPORATION

Offices: DALLAS • HOUSTON • NEW ORLEANS • BOSTON
KANSAS CITY, MO. • BIRMINGHAM • INDIANAPOLIS
ALBANY, N. Y. • BETHLEHEM, PA. • CHICAGO
NORFOLK • PHILADELPHIA • RICHMOND • ST. LOUIS
WASHINGTON, D. C. • NEW YORK

the OIL AND GAS JOURNAL

May 24, 1951

VOL. 50, NO. 3

EDITOR
C. O. WILLSON

MANAGING EDITOR
Kenneth B. Barnes

NEWS EDITOR
Henry D. Ralph

REFINING EDITOR
George H. Weber
415 Lexington, New York

INTERNATIONAL EDITOR
Dahl M. Duff
415 Lexington, New York

PIPE-LINE EDITOR
Paul Reed

TECHNICAL EDITOR
W. L. Nelson

ASSOCIATE EDITORS
Lynn M. Nichols
Neil Williams
R. B. Tuttle
Philip C. Ingalls
John C. Casper

DISTRICT EDITORS
D. H. Stormont
650 S. Grand, Los Angeles
Carl F. Hoot
Mercantile Bank Bldg., Dallas
Victor Lauriston
35 Stanley, Chatham, Ont.
Bertram F. Linz
621 Albee Bldg., Washington
Leigh S. McCaslin, Jr.
Sterling Bldg., Houston
F. Lawrence Resen
Sterling Bldg., Houston
Ted A. Armstrong
211 S. Cheyenne, Tulsa
Joseph A. Kornfeld
211 S. Cheyenne, Tulsa
John C. Reidel
211 S. Cheyenne, Tulsa
William P. Sterne
211 S. Cheyenne, Tulsa
Robert J. Enright
211 S. Cheyenne, Tulsa
Roy F. Carlson
McClintic Bldg., Midland, Tex.

EDITORIAL ASSISTANTS
Polly DeArmond, Tulsa
Connie Bahos, Tulsa
Lucy Dee Owen, Houston

ART DIRECTOR
C. Dudley Johnston

CORRESPONDENTS AT
Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., and Mount Pleasant, Mich.

• NEWS FEATURES

Record Rate of Drilling Not Adding to Reserve Producing Capacity 73
Well-Head Solution to Hydrate Problem Described at A.G.A. Meeting 74
New Houdriforming Process Announced by Houdry Process Corp. 75
Accelerated Amortization Granted for 122 Refining Projects 76
DPA Creates New Group to Review Demands for Metals 78
July Tubular-Goods Allotment Set at 150,000 Tons 78
New PAD Order Controlling Construction Now Being Prepared 79
Drilling Efficiency Up 45 Per Cent in Last 5 or 6 Years 80
Journal Editors to Present World Petroleum Congress Papers 81
East Texas Discovery Shows 42 Per Cent Hydrogen Sulfide 82
Texas Sets June Allowable at 2,939,868 Bbl. Daily 83
Oklahoma Water Floods Show Big Boost in Crude-Oil Output 84
Alberta Gas Reserves Estimated at 1.7 Trillion Cubic Feet 84
Six-Year Expansion Program in France to Be Finished Next Year 86
World Crude Output Reaches Another All-Time Record 88
Iranian Situation Still Confused; British Send Another Note 91

• ENGINEERING-OPERATING FEATURES

Miniature Seismograph Features Performance Plus Portability 96
Design, Operating Factors of Tank-Vapor-Recovery Systems 98
Double-Ramp Method Used in Laying Pipe-Line River Crossing 100
Quantitative Methods of Electrical-Log Interpretation 102
Corrosion-Prevention Program for T.C.C. Gas Plant 112
Effects of NaCl on Setting Properties of Oil-Well Cements 125
Value of Agents for Control of Silicate Swelling in Acidizing 134
Corrosion and Its Control—Magnesium Anode Groups 144
Questions on Technology 145
Refiner's Notebook—More on Grease Applications 147
Engineering Fundamentals—Water-Flooding Tests 149
Oil and Gas Equipment Digest 151

• EXPLORATION-DEVELOPMENT

Anadarko Area Heats Up Again 173
Highlights of Week's Developments 173
Reports by Areas Start on Page 174

• REGULAR DEPARTMENTS

They Say 59
Calendar of Events 61
Journally Speaking 67
Editorial 71
This Week 72
Watching Washington 79
International News 86
Personals 92
Deaths in the Industry 95
Book Reviews 140
Pipe-Line News 156
On the Line 158
Natural-Gas News 163
Natural-Gasoline News 163
Drilling Contractors 165
Refining News 169
Exploration Statistics 188
Production Statistics 189
Refining Statistics 190
Market Statistics 191
Equipment Men in News 193
Classified Advertising 195
Advertisers' Index 199

DANGER

DO NOT RUN packers, testers, swabs or retainers

...until the "working surface" of your casing is clean

This typical burr resulting from a gun-shot hole, clearly shows why so many operators always consider it a "must" to clean the WORKING SURFACE—the vital inner wall of casing—with the new Baker ROTO-VERT Casing Scraper.

It is easy to see why tools with rubber cups, or a rubber packing element, many times fail to set properly, and often are cut, torn and hopelessly damaged while running-in the well. Ninety-nine times out of a hundred, premature setting of packers, testers and retainers, or their failure to effect a leak-proof pack-off, is due *not* to faulty construction or operation of the tool, but to burrs, cement, hardened mud, or other obstructions which . . . PREVENT PASSAGE OF THE SLIPS • CUT OR OTHERWISE DAMAGE THE PACKING ELEMENT; *or* • PRESENT SUCH A ROUGH, UNEVEN SURFACE THAT A LEAK-PROOF PACK-OFF IS IMPOSSIBLE.

The new Baker Model "C" ROTO-VERT Casing Scraper is a helix-blade-type scraper which can be either rotated or "spudded" (reciprocated vertically) for the removal of perforation burrs, imbedded bullets, cement sheath or other obstructions from the inner wall of casing. The body is machined from bar stock, with two sets of machined (not cast) blades positioned for overlapping, 360-degree scraping coverage.

The direction and angle of shear of the deeply hard-faced cutting edges is *exactly opposite* from other helix-blade-type scrapers, which means that the scraping edges of the ROTO-VERT will not "screw down" past burrs, but will actually *shear away* burrs, cement and other obstructions.

CHOOSE THE BAKER CASING SCRAPER EXACTLY RIGHT FOR YOUR WORK

The new ROTO-VERT Scraper is at its best where hundreds of burrs, with possible imbedded bullets, or unusually long stretches of hardened cement must be removed. It operates successfully *with* or *without* rotary equipment.

For normal scraping, where rotary equipment is present, the time-tested Baker Model "B" Casing Scraper, Product No. 620-B, continues the popular choice of many operators.

Why not get in touch with your nearest Baker representative and secure specific recommendations for your next job? Or send for the new illustrated 28-page booklet which contains complete information on the important subject of Casing Scraping the Baker Way.

BAKER OIL TOOLS, INC.

Houston • Los Angeles • New York

BAKER
MODEL "C"
ROTO-VERT
CASING SCRAPER
PRODUCT NO. 620-C

Scrapes the "WORKING SURFACE" of your casing CLEAN and SMOOTH

Pipe-Line Freedom

The first liberalization of the Hepburn Act regulating oil pipe lines since that law was first tested in 1914 has just been made by the Supreme Court of the United States. It has held that the Interstate Commerce Commission cannot require Champlin Refining Co. to file public tariffs of its charges for moving refined products through its line from Oklahoma to Iowa, and cannot force it to serve as a public carrier by handling the products of others.

The lone dissenting justice expressed the view that the decision undermines, if not overrules, the entire line of judicial cases holding pipe lines to be common carriers. Whether the decision goes that far or not, it does mean that pipe lines will have somewhat greater freedom from regulation and that lower courts will be more liberal in their treatment of pipe lines.

The Hepburn Act was passed in 1906 in the midst of the fight on the old Standard Oil Co. and as a part of Teddy Roosevelt's trust-busting campaign. It specifically stated that every interstate oil pipe line is a common carrier. Except for the exemption of certain gathering lines in 1914, there has been no successful challenge of the law until now.

In two Champlin cases the Supreme Court has ruled that this products line is a common carrier to the extent that it must file valuation data, reports, and statistics and must follow a uniform system of accounts, but it is not a common carrier to the extent that it must publish rates or hold itself out to move oil for others.

This may be a case of "reading the rule of reason" into the language of a statute, for the court's decision turned on the showing that the Champlin line is in no position to monopolize the markets it reaches nor to prevent competitors from marketing their oil. The intent of Congress in 1906, it said, was to prevent monopoly, and "we find it hard to conclude that Congress intended to apply the sanctions of imposing the duty of serving the public at regulated rates on all private pipe lines merely because they cross state lines . . . (or) intended that the commission should make common carriers for hire out of private pipe lines whose services were unused, unsought after, and unneeded by independent producers."

It is significant that of the nine justices, four felt that Champlin should be exempted from all provisions of the act, and only one was for its strict and literal application. Other courts may take their cue from this in other cases. And while the Hepburn Act does not apply to natural-gas lines, the same reasoning may be applied should the common-carrier question come before the courts in a gas case.

The fact that this one products line retains its private-carrier status may not be of wide importance in the industry. But it is important that the courts are taking a practical view of the present-day facts of monopoly and competition in the oil industry. This could lead to greater freedom from strict regulation of pipe lines and from the fear of divorcement proceedings.

THIS WEEK

INTERNATIONAL—Iranian oil properties still operating under British control, but Iran rejects second note urging arbitration of dispute. . . . United States cautions Iran technical personnel will not be available if British are ejected from country. . . . Radical party leaders urge Iran to push for control over Bahrein Island. . . . ¶Syria invites United States operators to investigate oil possibilities there. . . . Iraq Petroleum giving up Syrian concession. . . . ¶Discussions between American firms and Israel over exploration work there reported under way.

REFINING—Accelerated amortization certificates through May 11 provide for 122 projects costing $570,917,000, including 71 "basic refining" projects to cost $422,990,803. . . . Projects to add about 528,000 bbl. daily to nation's refining capacity. . . . ¶Humble to put 70,000-bbl. pipe still at Baytown refinery on stream next month. . . . Unit to increase refinery capacity to 260,000 bbl. daily. . . . ¶World's largest vacuum flasher, 55,000-bbl. unit of Standard of California, to go on stream at Richmond in mid-July. . . .

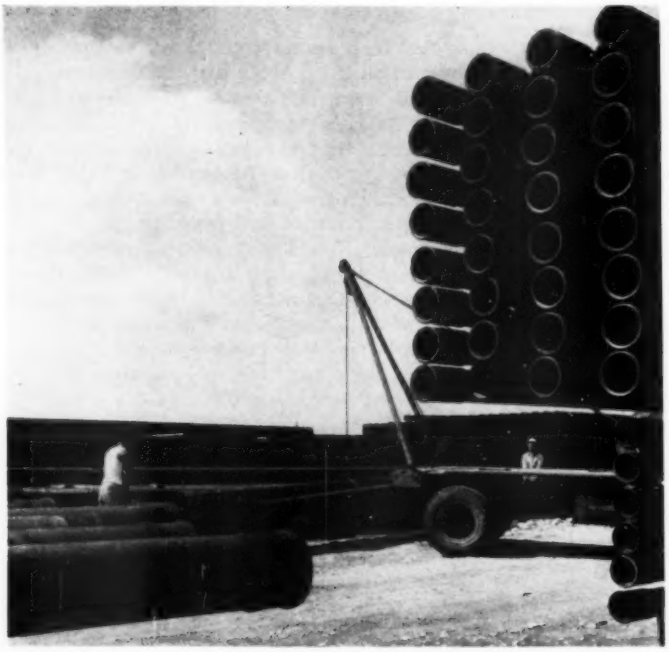
TECHNOLOGY—New type of oil-well surveying tool being used in West Texas. . . . Ultrasensitive temperature device locates points of casing failure, picks cement tops, reports location of gas or liquid flow. . . . ¶New process for catalytic reforming of low-octane naphthas to high-octane gasoline reported by Houdry Process Corp. . . . Process designed for continuous commercial operation without catalyst regeneration. . . . ¶Well-head solution to hydrate-formation problem described before A.G.A. production and chemical conference. . . .

PRODUCTION—Texas June allowable set at 2,939,868 bbl. daily, drop of 10,800 bbl. from May 12 figure but slightly higher than original May allowable. . . . ¶Sulfur shortage turns spotlight on East Texas gas-distillate discovery with hydrogen-sulfide content of 42 per cent. . . . ¶Nine-year water-flooding program in Oklahoma's Washington County shows production increase from 35 to 4,000 bbl. daily. . . . Further development planned. . . . ¶World production reaches new all-time high of 11,542,000 bbl. daily in March. . . . Figure is 1.4 per cent gain over February. . . . Majority of increase provided by United States. . . . Venezuela also heavy contributor, reporting seventh consecutive monthly record. . . .

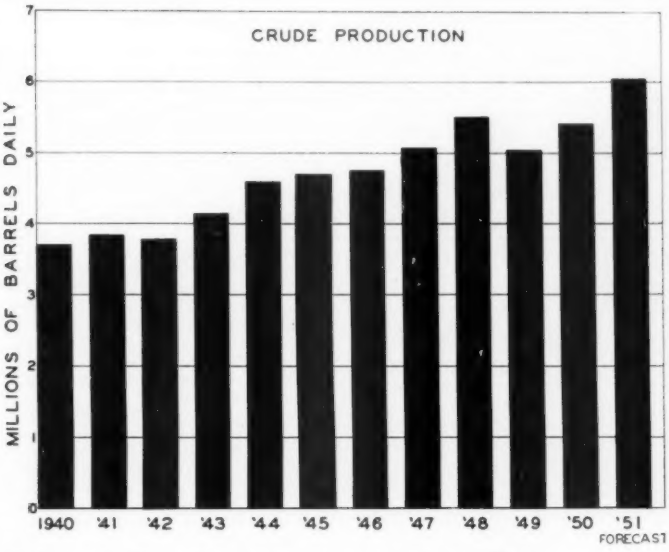
TRENDS—Production of crude and leased condensate for June is estimated at 6,200,000 bbl. daily. . . . Crude imports have been averaging 525,000 bbl. daily for a total new crude supply of 6,725,000 bbl. daily. . . . If refinery runs average 6,400,000 bbl. daily, crude inventories will increase about 6,000,000 bbl. for the month. . . .

ACTIVITY—Crude production averaged 6,105,505 bbl. for week ended May 19, a decrease of 1,695 bbl. daily from previous week. . . . Total completions for the week increased 109 wells to 919. . . . Wildcat completions totaled 242 wells compared with 195 for previous week and 135 for same week last year. . . . A total of 2,439 rotary rigs operating in United States on May 14 set a new all-time record with 37 more rigs than previous high on December 11, 1950. . . .

CONTROLS—PAD and NPA now working out provisions of a new order controlling construction in oil and gas industry. . . . Order will take industry out from under NPA general construction regulations, put it under PAD. . . . ¶New group organized by DPA to review over-all demands for steel, copper, aluminum, other critical materials. . . . Key group will recommend allocations to industries. . . . ¶DPA says $61,000,000 already issued in loans in program aimed at securing industrial expansion important to defense program. . . .



SOMETHING ADDED.—This picture was made back in the free-and-easy days of 1949, when oil men bought and used whatever amounts of tubular goods they wanted or needed. The photograph was made at the Odessa, Tex., production yards of Cities Service Oil Co.'s West Texas district. It might be duplicated today, with the addition, of course, of the specter of government control in the form of allocations, quotas, materials requests, and shortages. June allocation of tubular goods is 150,000 tons.



Needed: More Wells

Record rate of drilling will not build up extra producing capacity we need; rising demand to take additional output

John C. Casper

This is the first of a series by John C. Casper, associate editor of the Journal, on the new drilling and construction work facing the petroleum industry as a result of the increasing demands for petroleum products of all kinds.

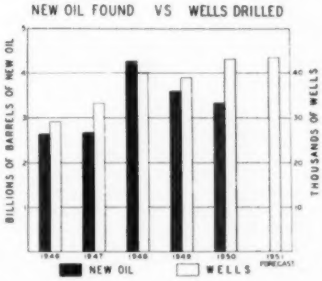
THE present rate of drilling, highest in the oil industry's history, will do no more than keep up with the rising demand and will not build up the extra producing capacity which government officials say is needed as an emergency reserve.

This conclusion is based on trends apparent in postwar data on drilling, production, and discoveries. These indicate that by drilling 48,000 wells per year the industry may increase its crude-producing capacity by 1,000,000 bbl. daily within 4 years—but by that time demand will have increased by the same amount, so the reserve capacity will be no greater than today.

Rising demand. — Required production to meet forecast demands in 1951 will be in excess of 6,000,000 bbl. daily.

The accompanying chart of crude production since 1940 shows an increase of almost 1,000,000 bbl. daily in the 4-year period 1943-47 and another increase of about 1,000,000 bbl. daily in the 4 years 1948 through 1951.

If production of natural-gas liquids is added to crude, the increase in output of total liquid hydrocarbons is well over 1,000,000 bbl. daily for each of the 4-year periods. In addition to increases in domestic production, the new supply for 1951 includes imports at a rate that is about 450,000 bbl. daily greater than in 1947.



To meet this expanding demand for domestic crude, operators must add to the total crude-producing capacity, and under the present unsettled world conditions it seems advisable to develop new capacity at a rate that exceeds increases in production. At the beginning of World War II, producing capacity was about 1,000,000 bbl. daily greater than production. Today it probably is less than half that amount.

Reserve ratio.—Producing capacity is developed by drilling and is roughly proportional to proven reserves. There is an optimum ratio of reserves to production and a permissible range from about 12 to 15 for this ratio.

When reserves are less than 12 times annual production, crude shortages develop. Conversely, a ratio above 15 tends to promote a soft crude market because of the pressure for increased allowables from operators who have wells producing below their rated capacities.

The ratio of total liquid hydrocarbon reserves at the end of 1950 to production for the year was 13.8, and the stability of the crude market indicates that the ratio is not too high.

A rough estimate of the amount of drilling required to develop additional producing capacity of 1,000,000 bbl. daily can be found through consideration of data on wells drilled and new oil found.

Discovery rate.—In the long run, the amount of new oil found in a given year is related to the number of wells completed in that year.

In the 5-year period from 1946 through 1950, operators completed 184,400 wells including dry holes. These wells found about 16,500,000,000 bbl. of new oil, crude and natural gas liquids.

Thus, an average of about 11,000 wells were required to find 1,000,000,000 bbl. of new oil. The small chart shows a comparison of wells drilled and new oil found since the end of the war. It should be noted that the results in 1950 were below the 5-year average, since over 12,000 wells were drilled for each 1,000,000,000 bbl. of new oil found during the year.

To increase producing capacity by 1,000,000 bbl. daily, or 365,000,000 bbl. per year, reserves must be increased proportionately. Since past experience has shown that reserves should be at least 12 times annual production, an increase of 365,000,000 bbl. in production will call for an increase in reserves of 12 times that amount or 4,400,000,000 bbl.

At the postwar rate of 11,000 wells for each 1,000,000,000 bbl. of new oil, it would take 48,000 wells to find the required oil.

Current production. — This does not mean that the next 48,000 wells drilled will add 1,000,000 bbl. daily to producing capacity, since this would be true only if no oil were produced while the wells were being drilled.

Production of crude and natural-gas liquids in 1950 amounted to 2,153,000,000 bbl., and it is estimated that it took at least 27,000 of the wells drilled that year to find enough oil to replace that taken out of the ground during the year.

Since total production for 1951 is

forecast at about 2,400,000,000 bbl., it will require at least 28,000 of this year's wells to find oil to replace that produced, even if discovery results are better than in 1950. If total completions for the year reach 44,000 wells, this would leave only 16,000 wells for actual net additions to reserves.

If it takes 48,000 wells to find enough new oil to back up an increase of 1,000,000 bbl. per day in production, and if we have only 16,000 wells per year over those required to replace the oil produced, it will take about 4 years to add the 1,000,000 bbl. daily to producing capacity.

If production follows the trend of the past 8 years, the daily average rate will be up another 1,000,000 bbl. at the end of 4 years, leaving no net increase in reserve producing capacity.

TECHNOLOGY

Hydrates Licked

Pipe-line gas production at well head now possible through use of low-temperature water-separation units

NEW YORK.—Hydrate formation has long been a perennial headache to producers of high-pressure gas. A solution to the hydrate problem under certain conditions of temperature and pressure has been reached at a point of greatest difficulty—the well head.

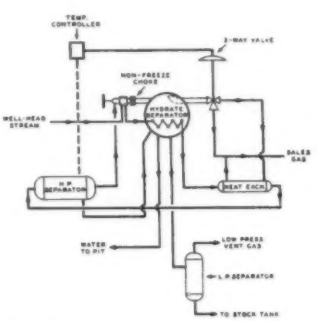
In a paper presented by F. C. Boston of United Gas Corp., Shreveport, members of the American Gas Association were told of this development last week at the association's annual Production and Chemical Conference.

Self-contained unit. — The approach to satisfactory field separation of water and liquid hydrocarbons employs a self-contained unit.

Efficient heat exchange between well production and cooled gas expanded to pipe-line delivery pressure serves to remove most of the produced water from both the vapor and liquid-hydrocarbon phases. Not only do the units remove more water than conventional field separators, they also strip more of the heavier hydrocarbon fraction from sales gas and produce a stabilized stock-tank liquid, also free of water.

This type of separation is limited by the amount of pressure drop between well head and pipe line and by the temperature of well production. But it appears applicable to a fairly wide field of operations in high-pressure gas fields, where the pressure differential is great enough and the temperature of production is low enough to permit reduction of water in sales gas to fall within normal requirements.

Operation of the well-head type is illustrated in the flow chart. The refrigerating effect of expanding gas to pipe-line delivery pressure is efficiently utilized in heat exchangers to remove water in both liquid and hydrate form. Well production is first cooled by exchange with the expanded



***WELL-HEAD SETUP.**—Flow arrangement for a typical low-temperature well-head unit used frequently on high-pressure gas-condensate wells.*

gas to a controlled temperature just above the hydrate point of the gas-water mixture. This initial temperature drop allows the maximum amount of water to be condensed and trapped in the high-pressure separator.

The gas is then expanded to pipe-line pressure in nonfreeze choke, and passes at a very low temperature to the hydrate separator. There, most of the remaining water is precipitated as hydrate.

At the bottom of the separator, heat from the well-stream exchanger melts the hydrate to liquid water. Total water separated from both the gaseous and liquid hydrocarbon phases is trapped and withdrawn from the system.

Liquid fractionation.—The heat supplied by the warm well-stream exchanger in the hydrate separator permits considerable fractionation of condensed hydrocarbons to take place. This results in a partially stabilized liquid mixture which retains most of the pentanes and heavier when it is flashed to stock-tank pressure.

The effect of dropping the temperature well below the hydrate point affords increased liquid-stock production, and decreases the gasoline content of pipe-line gas.

Limitations.—Field tests of the well-head units have provided data from which United Gas Corp. engineers can chart the limitations of the new technique and predict its performance. By means of these charts, they can determine the degree of dehydration to be expected in processing a given specific-gravity gas under varying conditions of pipe-line pressure and well-head pressure and temperature.

Performance tests of the well-head unit on a Gulf Coast gas-condensate well were conducted at flow rates ranging from 3.67 to 8.22 million cubic feet of pipe-line gas per day and with accompanying variations in well-head temperature and pressure and pipe-line pressure.

At the high flow rate a relatively low ratio of well-head pressure to pipe-line pressure and a relatively high well-head temperature resulted in reduction of water content in the sales gas to 32.0 lb. per million cubic feet and gasoline content, expressed as pentanes and heavier, to .271 g.p.m. At that flow rate the unit did not remove sufficient water to meet normal specifications.

Lower flow rates.—Tests conducted at three lower flow rates between 3 and 6 million cubic feet daily showed the unit capable of reducing both water and gasoline content in the sales gas to points below the typical specification requirements for high-pressure pipe-line gas.

The field performance of the new unit compared with conventional separators reveals increased water removal and increased stock-tank recovery with corresponding decreases in pipe-line-gas contents of water and gasoline.

Boston stated that the range of application of the type of well-head unit can be considerably extended, and gases having compositions similar to residue gas from gasoline-absorption plants can be obtained by expanding the gas through a work-producing mechanism, such as a turbine.

New Survey Tool

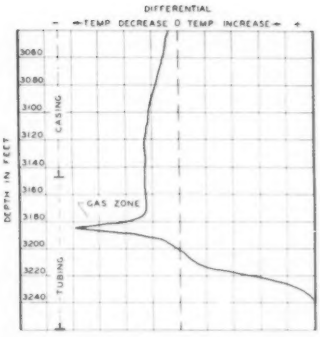
Ultrasensitive device picks casing leaks, cement tops

Roy F. Carlson

ODESSA.—A new kind of oil-well surveying tool has been introduced in West Texas.

The tool is used to conduct ultrasensitive temperature surveys in a well. It utilizes a principle and furnishes information that is new to the oil industry.

Rather than measuring the actual



SAMPLE LOG.—This Delta log was run for location of a gas zone in Sand Hills field, Crane County, Texas. The cooling effect of expanding gas is shown by the rapid temperature decrease recorded. Entry of the tool into warmer zones below also is shown.

bore-hole temperature continuously and plotting a thermal gradient in the well as do conventional temperature tools, the new device records small differences in temperatures between two temperature-sensitive elements.

For this reason the process has been named differential temperature logging, or Delta logging. The record made by the instrument may be likened to the mathematical first differential of the thermal gradient curve of the oil well. The Delta-log shows the rate of increase or decrease in well temperatures as the tool traverses a bore hole. It can be adjusted to show extremely small temperature differences. It was developed and is operated by Worth Well Surveys, of Fort Worth and Odessa, Tex.

How it works.—The tool consists of two thermally sensitive elements, contained in a bomb-like housing and spaced about 6 ft. apart on equipment now in use. These elements are electrically connected to the electronic measuring and recording equipment through a conductor cable and winch mechanism.

When the temperature of the two elements is the same, the electronic circuit is in balance and no signal is recorded at the surface. However, when one of the elements becomes hotter or colder than the other, such as when the lower element moves into a warmer or cooler zone, the circuit is thrown out of balance and a signal is delivered to the recorder. A temperature change of as little as one-hundredth of a degree can be made to cause an inch of movement of the recorder pen.

What it can do.—Because of the extreme sensitivity of the instrument, it can be used to detect points of casing failure where water is entering a well, where gas is escaping, or where any given zone is producing gas.

Other conditions of fluid movement may also be detected with the instrument, and it will pick cement tops accurately many hours after the cement has been put into place.

The down-the-hole part of the equipment is 1½ in. in diameter, permitting operation in tubing, and it can be fitted with sinker bars so that it can be lubricated into wells having as much as 1,700 psi. pressure.

New Process

"Houdriforming" described at Tulsa Chemical meeting

TULSA.—Development of a new continuous process for the catalytic reforming of low-octane naphthas to high-octane gasoline has been announced by Houdry Process Corp.

The process, according to C. G. Kirkbride, Houdry vice president in charge of research, also is suitable for manufacture of benzene, toluene, and xylenes from petroleum.

The new process is projected for continuous commercial operation without catalyst regeneration. A dual-function catalyst is used, he said, but he declined to identify it.

Announcement of the process, called "Houdriforming," was made here before a joint meeting of the local sections of the American Institute of Chemical Engineers and the American Chemical Society.

How it works.—The catalyst, developed by the Houdry Laboratories at Linwood, Pa., make possible dehydrogenation of naphthenes and isomerization of paraffins.

Through the first of these reactions ring naphthenes present in selected fractions of a crude are converted to aromatics. By converting normal paraffins of low-octane values to branched paraffins with high-octane value, the isomerization reaction is chiefly responsible for the up-grading of naphtha charge stocks.

Kirkbride also stated that the catalyst is not affected by sulfur compounds, including thiophenes. Desulfurization of the naphtha stock takes place and the sulfur compounds are converted to hydrogen sulfide.

Ordinarily the process is conducted without hydrocracking. That is, no olefins are produced and the off-gas from the reaction is essentially pure hydrogen, which is recycled to the catalytic section.

Continuous process.—An important feature of Houdriforming, as outlined by Kirkbride, is that it can be operated on a continuous basis.

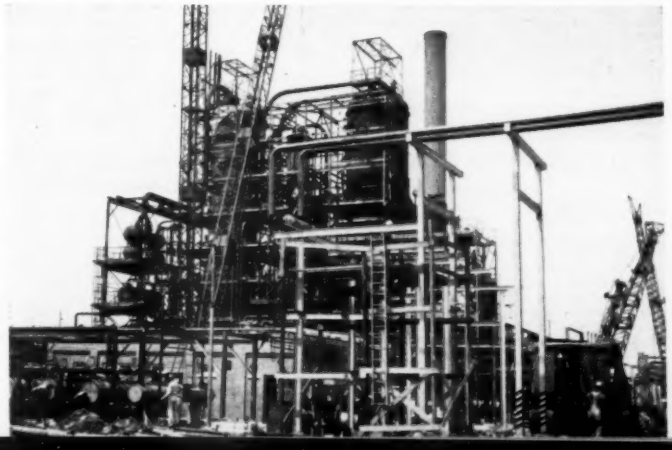
However, regeneration of the catalyst is possible and may be employed under special conditions, as under most severe conditions of reforming on unusually wide boiling-range charge stock.

Life tests on the catalyst showed 30 to 50 days of continuous operation without regeneration or loss of catalyst activity. Neither the nature of the catalyst nor its cost was revealed at the Tulsa meeting.

Houdriforming, Kirkbride said, can be set up for simultaneous production of benzene, toluene, or xylenes, or for both aromatics manufacture and production of high-octane gasoline. "The process is in an advanced state of pilot-plant development," he said. "Detailed process design and mechanical engineering for commercial scale operation are under way."

To Begin Operations Next Month

This is Humble Oil & Refining Co.'s nearly completed 70,000-bbl. pipe still at the Baytown refinery. The unit will boost rated daily crude throughput at Baytown to 260,000 bbl. daily. Actually, the increase will be only 10,000 bbl. a day, since most of the new capacity will replace that of outdated equipment. Humble calls the new unit a part of its "continuous improvement" program, which in the past 2 years has included a similar pipe still, a research center building, and a central shop building. (For additional information see page 169.)



Refining Expansion

Accelerated amortization granted for 122 projects since October 3; more than half will provide basic facilities

WASHINGTON.—A total of 122 projects for expansion of refining capacity and supporting facilities involving a capital cost of $570,917,000 have been recommended for accelerated tax amortization by the Petroleum Administration since October 3, 1950.

Analysis of these projects shows that the greater part of the industry's expansion has been in basic refining facilities, for which 71 projects to cost $422,990,803 have been approved.

Refiners have been allowed quick amortization on 50 to 75 per cent of these investments, the average for the group as a whole being 72.9 per cent. The projects will add approximately 528,000 bbl. daily to national refining capacity.

Another 22 projects to cost $36,150,330 will add an estimated 23,560 bbl. a day to aviation alkylate capacity. Thirteen other projects to cost $27,102,829 will provide facilities for producing approximately 5,116 bbl. daily of benzene, 3,675 bbl. of toluene and 10,980 bbl. of other types of aromatics. These projects, for which no post-emergency economic use is seen, are given 100 per cent amortization.

A group of 15 projects for supporting and petrochemical facilities to cost $83,873,044 includes facilities for producing tetraethyl lead, cracking catalysts, ethylene dibromide and other aviation gasoline components, and has been given quick amortization for from 75 to 100 per cent of cost. One project for $800,000 in terminal facilities (White Fuel Corp., Boston) was given an 85 per cent write off.

TABLE 1—BASIC REFINING FACILITIES RECOMMENDED FOR 75 PER CENT ACCELERATED AMORTIZATION

Company and location of facilities—	Estimated cost	Increase in capacity, bbl. per day— Crude oil topping	Catalytic cracking	Thermal cracking	Catalytic reforming	Catalytic poly'n.
Rothschild Oil Co., Santa Fe Springs, Calif.	$2,050,000		6,000			
Union Oil Co., Oleum, Calif.	4,500,000		28,500			
Fletcher Oil Co., Los Angeles	176,250	1,356		700		10
Aromatics Refining Co., Baton Rouge, La.	3,066,000				15,000	
Wood River Oil & Refining Co., Gary, Ind.	7,086,000	15,000	6,300			600
Levelland Refining Co., Amarillo, Tex.	2,441,763		3,000			150
Bay Petroleum Co., Chalmette, La.	1,726,500		5,000			
Gulf Oil Corp., Port Arthur, Tex.	18,485,342		60,000			
Union Oil Co., Los Angeles	12,000,000	20,000				
Petco Corp., Blue Island, Ill.	1,936,000		5,000			227
Atlas Processing Co., Shreveport	700,000				2,500	
M.F.A. Oil Co., Memphis	1,720,000	2,000	2,200			100
Aurora Gasoline Co., Detroit	3,970,000	16,000			6,000	
Sunland Refining Corp., Fresno, Calif.	561,655			900		
Western Oil & Fuel Co., Superior-Duluth, Minn.	6,000,000	10,000	3,000			200
Phillips Petroleum Co., Borger, Tex.	15,416,000	14,000	30,000			
Derby Oil Co., Wichita, Kans.	2,606,000	5,000	7,500			600
Pan-Am Southern Corp., Destrehan, La.	3,675,000	22,000	12,000		2,000	
Standard Oil Co. of California, El Segundo, Calif.	7,460,000				10,000	
Phillips Petroleum Co., Borger, Tex.	2,452,260	8,050				
Ben Hur Refining Corp., Long Beach, Calif.	2,240,000		6,000	3,000		300
Mathieson Hydrocarbon Chem. Corp., Louisville, Ky.	19,000,000	6,000				
Northwestern Refining Co., St. Paul, Minn.	2,089,998	1,000	2,700			
Mercury Oil Refining Co., Oklahoma City, Okla.	3,195,000	5,900	2,500	1,800		360
Ashland Oil & Refining Co., Wood River, Ill.	665,000	5,000		1,200		
Ashland Oil & Refining Co., Canton, Ohio	3,870,000	7,500	8,000			600
Superior Refinery Owners, Superior, Wis.	1,295,800	6,000		1,000		24
Western States Refining Co., Salt Lake City, Utah	1,092,700	3,000	2,200			
Sinclair Refining Co., Houston, Tex.	27,000,000	25,000	40,000			
Sun Oil Co., Marcus Hook, Pa.	4,889,400				11,000	
Sun Oil Co., Delhi, La.	148,952	130				
Frontier Natural Gasoline Co., Loco Hills, N. M.	703,986	630				
Standard Oil Co. (Ind.), Neodesha, Kans.	7,816,000	9,300	8,800			
Standard Oil Co. (Ind.), Sugar Creek, Mo.	21,170,000	30,000	5,000			300
Premier Petroleum Co., Fort Worth, Tex.	650,000				1,500	
Cities Service Oil Co., Ponca City, Okla.	6,500,000	11,000	8,350			
Taylor Refining Co., Corpus Christi, Tex.	5,057,493	10,000	8,000			370
Premier Petroleum Co., Fort Worth, Tex.	3,580,000	6,000	4,300			380
Old Dutch Refining Co., Muskegon, Mich.	101,150	3,700			500	
Kanotex Refining Co., Arkansas City, Kans.	2,347,423	5,050	4,500			
Cosden Petroleum Corp., Big Spring, Tex.	1,625,000				4,000	
Standard Oil Co. (Ohio), Cleveland	4,230,000	7,000	18,000			40
Cosden Petroleum Corp., Big Spring, Tex.	270,000	4,000				
Shell Oil Co., Houston, Tex.	5,796,000				12,200	
Pure Oil Co., Smiths Bluff, Tex.	10,750,000	12,100	17,000			135
Pure Oil Co., Toledo, Ohio	7,140,000		10,500			600
Continental Oil Co., Lake Charles, La.	21,339,459	28,000	17,000		3,765	333
Standard Oil Co. of Texas, El Paso, Tex.	7,513,500	1,400	5,200			
California Refining Co., Perth Amboy, N. J.	29,366,261	47,000	25,000	10,000		
Fulton & Olmstead, San Antonio, Tex.	8,801,000	10,000	4,650		1,640	
Phillips Oil Co., Sweeny, Tex.	4,787,200	13,000	2,000			
Total (through March 31, 1951)	$318,000,090	371,116	368,700	18,600	70,105	5,329

TABLE 1A—BASIC REFINING FACILITIES RECOMMENDED FOR ACCELERATED AMORTIZATION

Company and location of facilities—	Estimated cost	Per cent recommended	Increase in capacity, bbl. per day— Crude oil topping	Catalytic cracking	Catalytic reforming	Catalytic poly'n.
Puerto Rican Refining Co., Puerto Rico	$13,385,000	75	20,000	11,000		
Bell Oil & Gas Co., Grandfield, Okla.	289,322	75			1,500	
Midwest Refineries, Inc., Alma, Mich.	933,700	75	6,200		1,500	
Standard Oil Co. of California, Richmond, Calif.	9,000,000	70		7,500		
New Mexico Asphalt & Refining Co., Artesia, N. M.	1,957,000	75	3,000	6,000		300
Shell Oil Co., Wood River, Ill.	*274,000	75				
Roosevelt Oil & Refining Co., Mount Pleasant, Mich.	894,900	75			1,380	

Kendall Refining Co., Bradford, Pa.	913,672	75			1,500	
Standard Oil Co. of California, El Segundo, Calif.	†57,000	50				
Standard Oil Co. (Ind.), Whiting, Indiana	‡709,300	75				
Phillips Petroleum Co., Sweeny, Tex.	§40,767	75				
Crown Central Petroleum Corp., Houston, Tex.	265,000	70	2,350	2,400		
Gulf Oil Corp., Philadelphia, Pa.	40,596,740	65	76,000	47,000	8,930	
Petroleum Spec., Inc., Flat Rock, Mich.	700,000	70			900	
Gulf Oil Corp., Port Arthur, Tex.	*287,212	50				
Wilcox Oil Co., Bristow, Okla.	1,030,000	65			1,500	
Southwestern Oil & Refining Co., Corpus Christi, Tex.	5,520,000	70	15,300	5,000		
Socony-Vacuum Oil Co., Buffalo, New York	4,588,000	50		4,500		672
Great Northern Oil Co., St. Paul, Minn.	22,550,000	64	30,000	7,620	6,000	680
Union Oil Co., Edmonds, Wash.	1,000,000	70	4,000			
Total (April 1 through May 11, 1951)	$104,990,713		156,850	91,020	23,210	1,852
Grand total	$422,900,803		527,966	459,720	93,315	7,181

*Gas line. †Fuel shipping. ‡Revisions for benzene. §Marine loading. ¶Fuel oil storage.

TABLE 2—AVIATION ALKYLATE AND SPECIAL ALKYLATION FEED FACILITIES

(Recommended for 100 per cent accelerated amortization)

Company and location of facilities—	Capital cost	Capacity, bbl. per day: Aviation alkylate	Capacity, bbl. per day: Iso-butane
Union Oil Co., Los Angeles	$135,000	250	
Phillips Oil Co., Borger, Tex.	157,700	1,400	
Pan-Am Southern Corp., Destrehan, La.	1,825,000	2,500	
Phillips Petroleum Co., Borger, Tex.	1,604,315		760
Sun Oil Co., Delhi, La.	88,545		197
Standard Oil Co. (Ind.), Neodesha, Kans.	2,213,000	850	
Standard Oil Co. (Ind.), Whiting, Ind.	2,327,500	*1,000	
Sunray Oil Corp., Duncan, Okla.	1,750,866	2,100	
Sun Oil Co., Marcus Hook, Pa.	2,577,145	850	
Pure Oil Co., Smiths Bluff, Tex.	390,000	1,901	
Continental Oil Co., Lake Charles, La.	571,392	1,573	
Standard Oil Co. of Texas, El Paso, Tex.	2,750,500	940	
California Refining Co., Perth Amboy, N. J.	3,614,322	2,240	
Fulton & Olmstead, San Antonio, Tex.	3,124,000	1,335	
Phillips Pet. Co., Sweeny, Tex.	3,630,200	1,800	
Total (through Mar. 31, 1951)	$26,760,485	18,739	957

*Hydrocodima equivalent to alkylate.

TABLE 2A—SPECIALIZED FACILITIES RECOMMENDED FOR ACCELERATED AMORTIZATION

Company and location of facilities—	Capital cost	Per cent recommended	Cap., bbl. per day: Aviation alkylate	Cap., bbl. per day: Iso-butane
Puerto Rican Refining Co., Puerto Rico	$4,350,000	100	500	
Great Northern Oil Co., St. Paul, Minn.	3,525,000	100	2,150	
Shell Oil Co., Wood River, Ill.	243,000	100	164	
Standard Oil Co. of Calif., Richmond, Calif.	24,000	100		iC_4 handling
Socony-Vacuum Oil Co., E. St. Louis, Ill.	260,000	100	775	
Humble Oil & Refining Co., Baytown, Tex.	177,845	100	800	
Lion Oil Co., El Dorado, Kans.	810,000	100	432	
Total Apr. 1 through May 11, 1951	$9,389,845		4,821	
Total Oct. 3 through Mar. 31, 1951	$26,760,485		18,739	957
Grand total	$36,150,330		23,560	957

TABLE 3—BENZENE AND AROMATIC AVGAS BLENDING STOCK FACILITIES

(Recommended for 100 per cent accelerated amortization)

Company and location of facilities—	Capital cost	Capacity, bbl. per day: Benzene*	Capacity, bbl. per day: Toluene*	Capacity, bbl. per day: Aromatic base†
Aromatic Refining Co., Baton Rouge, La.	$3,564,000	640		1,360
Pan American Refining Co., Texas City, Tex.	1,100,000		600	
Atlas Processing Co., Shreveport, La.	1,900,000	420		
Standard Oil Co. of Calif., El Segundo, Calif.	6,540,000	860		3,060
Sun Oil Co., Marcus Hook, Pa.	3,490,600	550	1,000	1,800
Standard Oil Co. (Ind.), Whiting, Ind.	938,500	....	390	1,820
Old Dutch Refining Co., Muskegon, Mich.	515,130	150	370	....
Cosden Petroleum Corp., Big Spring, Tex.	1,325,000	100	230	420
Shell Oil Co., Houston, Tex.	4,604,000	1,250	....	2,500
Continental Oil Co., Lake Charles, La.	1,909,299	182	636	....
Total (through Mar. 31, 1951)	$25,886,529	4,152	3,226	10,980

*Chemical grade. †Includes toluene and xylene concentrates.

TABLE 3A—SPECIALIZED FACILITIES

(Recommended for 100 per cent)

Company and location of facilities—	Capital cost	Capacity, bbl. per day: Benzene*	Capacity, bbl. per day: Toluene*	Capacity, bbl. per day: Aromatic base†
Roosevelt Oil & Refining Co., Mount Pleasant, Mich.	$605,600	214	224	....
Shell Oil Co., Wood River, Ill.	150,000	....	225	....
Standard Oil Co. (Ind.), Whiting, Ind.	460,700	750	....	....
Total April 1 through May 11, 1951	$1,216,300	964	449	....
Grand total	$27,102,829	5,116	3,675	10,980

*Chemical grade. †Includes toluene and xylene concentrates.

TABLE 4—SUPPORTING FACILITIES RECOMMENDED FOR ACCELERATED AMORTIZATION

Company and location of facilities—	Capital cost	Per cent recommended	Product
Filtrol Corp., Salt Lake City	$725,406	85	60T/D catalyst
Filtrol Corp., Salt Lake City	1,979,703	85	100T/D catalyst
Dow Chemical Co., Midland, Mich.	70,000	100	6,000,000 lb. per year ethylene dibromide
Dow Chemical Co., Ludington, Mich.	433,500	100	2,000,000 lb. per year bromide
Dow Chemical Co., Midland, Mich.	200,000	100	15,000,000 lb. per year ethylene dibromide
Dow Chemical Co., Midland, Mich.	630,000	100	13,200,000 lb. per year bromide
Dow Chemical Co., Midland, Mich.	100,000	100	15,000,000 lb. per year crude eth. dibrom.
Gulf Oil Corp., Port Arthur, Tex.	15,427,000	80	180,000,000 lb. per year ethylene
Ethyl Corp., Houston, Tex.	44,135,000	85	80,000,000 lb. per year tetraethyl lead
Ethyl Corp., Baton Rouge, La.	4,041,000	75	30,000,000 lb. per year tetraethyl lead
Ethyl-Dow Chemical Co., Freeport, Tex.	8,185,000	100	23,000,000 lb. per year ethylene dibromide
Ethyl Corp., Baton Rouge, La.	175,000	90	Plant security
Standard Oil Co. (Ind.), Wood River, Ill.	2,552,000	80	Isooctyl alcohol
Standard Oil Co. (Ind.), Sugar Creek, Mo.	142,000	80	Heptenes
American Cyanamid, Michigan City, Ind.	5,077,035	85	1,800 T/M catalyst
Total	$83,873,044		

Materials Referee

DPA forms new group to review over-all demands

WASHINGTON.—A key group in defense-program setup has been formally established by the Defense Production Administration. It is the materials requirements committee which will be responsible for reviewing over-all demands for steel, copper, aluminum, and other critical materials and for recommending policies and programs for balancing supply with demand.

The requirements committee will recommend amounts of materials to be allotted to industries under the controlled-materials plan. Its membership will include representatives of functional areas such as civilian requirements, foreign requirements, industrial manpower, industrial production, military requirements, and petroleum and natural gas.

The group will assist in determining the policies and programs to be adopted by the DPA to assure effective use of vital resources in short supply. It will also review over-all demand and supply problems and make recommendations to prevent production bottlenecks that would upset the balance between supply and demand.

Materials claims by the Petroleum Administration for Defense for operations of the oil and gas industry will have to pass the scrutiny of this committee. Committee chairman, Charles E. Wampler, director of the DPA office of program and requirements, will make the final determinations relative to the requirements for such resources as may be needed for the defense program and industrial mobilization. He will also determine available supplies of such resources and the amount by which they should be increased; develop programs for the direction of resources to various alternative uses, and formulate policies relating to the allotment of such resources including the necessary coordination of related or competing programs.

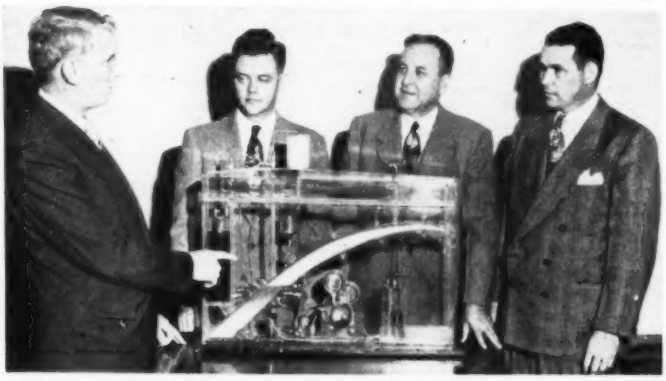
PAD Opens Branch Office

WASHINGTON. — The Petroleum Administration opened its first branch office this week in New York.

The office is located in the Circle Building, 1834 Broadway, telephone Judson 6-0090, and will be directed by Virginia Harrison, administrative assistant, pending the appointment of a full-time head.

Decision to open the New York office was based in part on the lack of space available to PAD in Washington. It will be used largely as a point of contact with oil companies operating abroad and with other companies having their headquarters in New York. Representatives of the foreign division are expected to be assigned there in the near future.

PAD officials said there is no intention of decentralizing the agency and the operating force will be maintained in Washington.



Unitization Explained

Three representatives of Phillips Petroleum Co. are shown here as they conducted a seminar on the engineering and legal aspects of unitization before law, engineering, and geology students at the University of Notre Dame. The seminar marks the first attempt by a major company to cooperate with a law school in presenting the factual basis and legal aspects of unitization. Left to right are Dr. Herman H. Kaveler, assistant to the vice president in charge of production; Paul M. McCreery, physicist in the research and development department; and R. M. Williams, attorney, all of Phillips; and Prof. Robert E. Sullivan, of the Notre Dame College of Law. In the foreground is a model designed by McCreery and used to demonstrate the physical production of crude oil.

Pipe Quota

NPA sets allotment for July at 150,000 tons

WASHINGTON.—Approximately 150,000 tons of oil-country tubular goods will be made available to operators in July under new directives issued by the National Production Authority.

NPA has sent instructions to the steel mills regarding the percentages of production they are to set aside. The mills, under the M-46 order, are required to reserve for distribution by the Petroleum Administration for Defense 110 per cent of the average monthly shipments during the first 8 months of 1950.

The above-par figure was adopted, PAD officials explained, because during the early part of last year operators were depleting their tubular inventories, and shipments were low. The 150,000 tons is seen as adequate to keep up the 43,400-well program.

Line pipe.—An NPA reservation of 35 per cent for line pipe was less informative since it represents a proportion of a quantity which PAD said was still unknown.

No definite instructions were given the mills for setting aside steel plates. These will be produced under directives to be issued later. Total production of plate is expected to be about 885,000 tons per month during the third quarter, but this will include plate for freight cars, military needs, and other purposes, as well as line pipe. How much pipe will be produced, accordingly, has not yet been worked out, but only 35 per cent of it must be reserved.

Defense Orders

WASHINGTON.—The following orders have been issued by the National Production Authority:

M-60, May 14: Providing priority for the procurement of materials for the production of bolts, nuts, valves and fittings, ball bearings, and certain other components.

M-61, May 14: Providing priority for the procurement of materials for the manufacture of machine tools.

Amendment to Delegation 1, May 15: Restricting the authority of government agencies to act as claimant agencies.

DPA Loans Total $61,000,000

WASHINGTON.—The Defense Production Administration has advanced about $61,000,000 in loans so far of the several hundred million it has available for securing industrial expansion important to the defense program.

The latest report on lending activities shows that 33 projects have been

financed at a total outlay of $60,821,504 up to May 14.

The figures were disclosed in an announcement that six loans had been consummated, two of them for petroleum-storage facilities, during the 6 weeks ended May 14.

The oil loans were $810,000 to L. P. Steuart & Bros., Inc., Washington, to purchase and erect six storage tanks for aviation gasoline, and $300,000 to Southland Oil Corp., Savannah, Ga., for the erection of facilities for storage of products for the armed services.

All of the DPA loans bear an interest rate of 5 per cent and mature over a period of 5 to 15 years.

M-46-b Coming

PAD to exercise control of oil and gas construction

WASHINGTON. — Officials of the Petroleum Administration for Defense and National Production Authority are working out the details of a new order, M-46-b, under which PAD will control construction in the oil and gas industry.

The new order will take the industry out from under the NPA construction regulation, M-4, recently amended to require specific authorization for construction of industrial facilities with a view to conserving steel and other construction materials. Under the M-4 order, NPA permission to build would be required for any oil facility, including pipe lines, requiring the use of more than 25 tons of steel in the basic forms and shapes designated in NPA order M-1.

Following amendment of M-4, NPA Administrator Manly Fleischmann advised PAD Deputy Administrator Bruce K. Brown that authority over oil and gas industry construction would be delegated to PAD in conformity with agreements previously reached in regard to the oil agency's powers over the industry.

"In keeping with these understandings," Fleischmann said, "we shall look to PAD to effect proper distribution of materials within the petroleum and gas industries. Where this is appropriately done by evaluation of projects under construction limitations, we shall look to the PAD to make final determinations as to those projects which must go forward in furtherance of the petroleum and gas programs."

Fleischmann pointed out that so far as the oil and gas program is concerned, methods of distribution primarily relate to authorization of construction projects. This is because primary uses of materials in the industry are either for maintenance and repair of existing facilities or for creation of new facilities required to assure adequate supplies of oil, gas, and products, he said.

WATCHING WASHINGTON

Bertram F. Linz

Socialist Tendencies?

Industrialists who have studied pending legislation extending the Defense Production Act until June 30, 1953, are convinced it could pave the way for rapid socialization of American industry. Many members of Congress, who are now digging into the matter, are inclined to agree with them.

The bill was not written by Senator Maybank of South Carolina or Representative Spence of Kentucky, who introduced it, but in the government departments. It contains many features for which no justification can be found readily.

The provisions which will be most hotly contested if they go to the Senate and House floors would revive the old Borah-O'Mahoney idea of federal charters for all corporations and the CIO-sponsored plan for national production councils which would make decisions as to operation and production now made by management.

There are many other provisions, however, almost equally disturbing to business which are sought by President Truman, among them the following:

Authority (without explaining the reason or need) to provide exemptions from the prohibition against the hoarding of scarce materials.

Authority to condemn and take possession of real property with or without the knowledge of the owner upon mere filing of a petition in any court.

Almost unrestricted authority to acquire or build government plants.

Authority to create new government corporations.

Unlimited authority to lend money for defense activities. Such lending now is limited to $600,000,000.

Stiffer penalties for violation of wage or price regulations.

Authority for the President to make investigations ordinarily handled by congressional committees.

Gas Worries

Military planners are really worried over a natural-gas supply situation which is retarding the reactivation of munitions plants put into mothballs after the end of the last war.

These plants, many of them in the Middle West, operated on natural gas during the war. When they closed, the gas was diverted to other customers. Now, not enough gas remains to let them operate unless supplies are taken from other customers. So far it is not known whether this could be done without depriving equally important defense plants of fuel.

Plans for the construction of new defense plants in the Appalachian area have been held up for the same reason.

With line-pipe supplies so short, the upshot is likely to be construction of new transmission lines to serve defense-production areas with a consequent set-back in the building of lines to pipe gas into sections of the country not now served.

A definite warning that many planned lines probably could not be constructed in the near future was given at the recent meeting of the Interior Department's Gas Advisory Council by C. P. Rather, assistant deputy administrator for gas.

Tidelands Stalemate

Sen. Joseph C. O'Mahoney of Wyoming has been successful in blocking approval of the tidelands quit-claim bill by his interior affairs committee but is encountering greater difficulty in keeping his bill for interim federal management of Gulf of Mexico submerged oil lands from being turned into a measure for state management.

Several recent meetings of the committee have brought the issue to a head, and tentative approval at least has been given a series of amendments by Sen. Russell B. Long of Louisiana under which the states would retain administrative control until Congress definitely decides who is to own the tidelands.

Voting in the committee indicates that the stalemate, which has stalled enactment of tidelands legislation for many months, still exists. While the committee voted 7 to 6 last month against substituting the quit-claim bill for the O'Mahoney resolution, the later ballot on Long's amendments shows that the O'Mahoney measure cannot get to the Senate floor in the form in which it was introduced.

The committee is meeting once a week and will soon reach the point where it has to take a decisive vote to either kill the legislation for this session or send some form of measure to the Senate leaving control temporarily in the hands of the states.

Drilling Efficiency Up

Operators getting more and better footage per dollar spent, Thompson says; educational program given credit

MIDLAND, Tex.—The efficiency of the drilling industry has increased in the neighborhood of 45 per cent during the past 5 or 6 years, and this can be attributed largely to the educational program of the American Association of Oilwell Drilling Contractors.

This conclusion by A. W. Thompson, president of A.A.O.D.C., was presented to the Permian Basin Section of the American Institute of Mining and Metallurgical Engineers here May 21.

"We have had tremendous improvement in equipment in the past 10 years, but were it not for the trained personnel, this increase in efficiency in penetration rates would not have been achieved," Thompson said.

"This is being proved by those who have taken advantage of the association's educational programs. Training is reflected not only in the technological end of the work but there is also developed an improved morale and attitude, greater teamwork among the men, and an intangible quality of workmanship that leads to definite results—more and better footage of hole per dollar spent."

To substantiate this conclusion Thompson presented statistics to show that the footage drilled per man and per rig has increased steadily and in about the same proportion as the increase in the association's training program.

The various training courses handled a total of 642 men in 1946; 2,328 in 1947; 2,947 in 1948; 2,720 in 1949; 3,249 in 1950, and 1,913 so far this year. The courses include mud schools, accident-prevention conferences, management institute, drilling-engine courses, supervisory training, drilling-practices courses, and the new field institutes begun in 1951.

These programs cost $12,640 in 1946; $39,230 in 1947; $38,720 in 1948; $67,772 in 1949; $71,215 in 1950; and $36,919 to May 1, 1951. Of the total expenditure of $266,496, $35,750 was supplied by A.A.O.D.C. funds, $78,476.50 came from state vocational funds, $132,962.50 from fees by industry, and $19,307 from other sources.

Among the data presented by Thompson were the two accompanying tables showing the increase in rotary-drilling activity and efficiency, and his factor of the ratio of trained men in the industry.

The latest addition to the A.A.O.D.C. program, Thompson reported, is known as field institutes and is a specialized type of supervisory training aimed at toolpushers and drilling superintendents, pinpointing specific drilling problems through the use of well-prepared conferences.

Thompson credited the educational program with an increase in the amount of drilling being done by contractors. His figures showed that 80 per cent of all wells drilled in the United States in 1945 were drilled by contractors, but that this percentage increased to 81 in 1946 and 1947, to 82 in 1948, to 85 in 1949, and to 89 in 1950. The association's program, he said, is directed to aiding both large and small contractors, but its value is attested by the fact that many oil companies have sent men to the courses and some of them have adopted the methods for their own organizations.

The latest educational project of the association is compilation of an illustrated booklet on oil-well drilling terminology, Thompson announced. The publication will be primarily for office personnel, but may form the basis for a series of training meetings.

TABLE 1—UNITED STATES ROTARY-DRILLING STATISTICS

Year	Men employed in rotary drilling	Average No. rotary rigs operating	Rotary footage drilled (million feet)	Rotary wells drilled	Average well depth
1945	33,418	1,705	63.03	18,037	3,489
1946	31,115	1,562	67.46	20,167	3,345
1947	35,437	1,808	79.05	23,224	3,404
1948	42,434	2,165	102.68	29,651	3,463
1949	39,396	2,010	110.32	31,005	3,558
1950	42,356	2,161	130.21	35,298	3,689

TABLE 2—ROTARY-DRILLING PENETRATION DATA

Year	Wells drilled per average rig operating	Footage drilled per average rig operating	Yearly average ft. of hole per man employed	Ratio of men trained to men employed
1945	10.6	37,000	1,885	
1946	12.9	43,150	2,165	.0206
1947	12.8	43,700	2,230	.0656
1948	13.7	47,400	2,420	.0460
1949	15.4	55,000	2,800	.0690
1950	16.3	60,300	3,080	.0766

Rig Record

Number at all-time high; further increase expected

A NEW all-time record in the number of rotary rigs operating in the United States and western Canada was set during the week ended May 14 (latest survey).

Active rigs that week totaled 2,547, exceeding by 26 the previous number of 2,521 rigs reported running during the week ended last December 11.

The total represents an increase of 38 in the number of rigs operating the previous week. There were 436 more rigs running than at the same time a year ago.

The total of 2,439 rigs reported running in the United States alone during the above week also was a record for this country, exceeding the previous peak, set during the week ended last December 11, by 32 rigs. There were 37 more rigs running than during the previous week and 383 more than during the corresponding week a year ago. The West Texas-New Mexico area, where drilling is continuing at a high level, accounted for 873 rigs, the greatest number on record in that area.

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended May 14, 1951	Change week ended May 7, 1951	Change week ended May 15, 1950
Gulf Coast	554	+ 6	+ 72
W. Tex.-N. M.	873	+19	+147
Ark.-N. La.-E. Tex.	146	0	+ 6
Oklahoma	291	— 5	+ 30
Kansas-S. Nebraska	157	+ 3	+ 19
Illinois-Eastern	148	+16	+ 19
Rocky Mountains	125	— 4	+ 65
Pacific Coast	145	+ 2	+ 25
Total U. S.	2,439	+37	+383
Western Canada	108	+ 1	+ 53
Total	2,547	+38	+436

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States as a whole and the Pacific Coast and Illinois-Eastern areas are shown by charts on pages 188 and 189.

The new all-time "high" in number of active rigs comes at a time of year when drilling activity normally experiences a seasonal upturn, increasing in volume through the summer and autumn months to a peak at the end of the year.

If precedent is followed, the number of active rigs this year can be expected to mount to unprecedented levels and steadily higher records.

Eyes on The Hague

Four members of Journal staff to present papers at Third World Petroleum Congress; 2,000 expected to attend

FOUR members of The Oil and Gas Journal editorial staff will present papers at the forthcoming Third World Petroleum Congress.

This important, world-wide technical meeting on all divisions of the petroleum industry will be held at The Hague, the Netherlands, May 28-June 6. Preregistration indicates an attendance of more than 2,000. More than 200 papers will be presented.

The four members of the Journal staff who will present papers are Kenneth B. Barnes, managing editor, on "Field Processing of Oil and Gas;" George H. Weber, refining editor, "Modern Petroleum Processing;" Leigh S. McCaslin, Jr., Gulf Coast district editor, "Drilling and Producing Oil and Gas in the Gulf of Mexico;" and W. L. Nelson, technical editor, "Properties of Venezuelan Crude Oils."

Each paper details technological advances in the subjects covered and presents engineering data assembled from operating sources.

Design of the congress is the reporting on an international scale important advancements in all divisions

KENNETH B. BARNES

GEORGE WEBER

L. S. McCASLIN, JR.

of the oil industry, and bringing together members of the industry for discussion of technical problems and presentation of papers embodying results of research, discussion of new ideas, and improvements and methods in processes.

The first World Petroleum Congress was held in London in June 1933, and the second congress met in Paris in 1937. The first congress included 150 papers and attendance of several hundred oil men, and the second meeting was even broader in scope and in the number of papers presented. The present third congress is a replacement for 1940 meeting scheduled in Berlin.

W. L. NELSON

Subjects represented on the program include geology and geophysics; drilling and production; physical operations in oil processing; oil processes involving chemical conversions; production of chemicals from petroleum, their properties and applications; measurement and control, analysis and testing, composition of petroleum; utilization of oil products; construction of equipment, materials, corrosion; transportation, storage, and distribution; economics and statistics, documentation, education and training.

The Journal has planned for thorough coverage and reporting of the meeting. Barnes left for The Hague early this week and will cover all sessions of the 10-day meeting and will file covering news reports for subsequent editions of the Journal. Nelson, technical editor, also will be in attendance, and the two editors will present the four engineering reports by the Journal staff previously mentioned.

The Journal issues of May 31 and June 6 will carry additional editorial pages which will permit inclusion of technical digests of the papers presented at the meeting.

Graham-Paige Buys Olsen

NEW YORK.—Graham-Paige Corp. has acquired 100 per cent ownership of R. Olsen Oil Co., Oklahoma City producing company with properties in New Mexico, Texas, Oklahoma, and Kansas.

Graham-Paige first became interested in the company in November 1949 through a loan, and in May 1950 took a 40 per cent interest. R. Olsen, well known as an independent operator, will continue as operating head of the company.

The Olsen company properties include production in Lea County, New Mexico, and in Liberty and Winkler counties, Texas. It has some 160 oil and gas wells, owning all or a substantial part of the working interest.

Graham-Paige sold its automobile business in 1947 to Kaiser-Frazer. It now is an investment organization. Besides Olsen, it has Whitney-Apollo Corp., which leases rolling-mill facilities, an interest in Kaiser-Frazer, and various stocks.

GULF COAST

Deep Ship Channel Proposed

HOUSTON.—A proposal to deepen the Houston Ship Channel to 40 ft. to accommodate the "defense supertankers" now being built has been made by Port Director W. F. Heavey on behalf of the Navigation District.

Deepening of the channel, estimated to cost $21,000,000, plus a plea for federal funds was proposed at a public hearing before Col. E. I. Davis, district army engineer.

The improvement program would include the construction of a new turning basin; widening of the channel at several point; construction of a dam; and the easing of eight bends to eliminate navigation hazards.

It was estimated that the flow of petroleum products through the port would increase to 43,000,000 tons by 1956 and to 53,000,000 tons in 10 years. The port handled 32,000,000 tons of petroleum products in 1950. A current improvement project is deepening the channel from 34 to 36 ft.

In addition to terminal facilities, many oil companies have docks for handling tanks and barges.

Deep Portilla Test Planned

CORPUS CHRISTI. — A 20,000-ft. test for Portilla field, northeast of here in San Patricio County, is planned by Superior Oil Co.

Superior last week applied for a permit to deepen its 27 Minnie S. Welder which is now bottomed at 13,785 ft. with the 9⅝-in. pipe cemented at 9,090 ft. Portilla produces crude oil from the 7,100-ft., 7,300-ft., 7,400-ft., and the 8,100-ft. reservoirs.

Deepest producing area for South Texas is Sun Oil Co. 1 Thompson in West Goliad field of Goliad County, a 1945 completion, productive from a depth of 11,149 ft. in the Wilcox (Eocene) series.

Deepest test for lower Gulf Coast is Texas Co. 6 Yturria L. & L. Co. in Raymondville field of Willacy County, which stopped at 16,006 ft. in 1947.

Sulfur Producer

East Texas gas-distillate discovery has hydrogen-sulfide content estimated at 42 per cent; corrosion is problem

A SHORT supply of sulfur has turned the spotlight of interest on an East Texas gas-distillate discovery, in which preliminary analyses show hydrogen sulfide content to be as high as 42 per cent.

The new discovery is the 1 H. L. Puckett of R. J. Caraway, Dallas, located about 4 miles southeast of Emory, in Rains County.

Few tests have been made at the well, due to the highly corrosive gas. Its ultimate worth will depend upon further testing, as well as additional drilling.

Handling the gas and distillate from the discovery has presented a ticklish problem. It is highly poisonous as well as corrosive. Completion was made from perforations at 11,958-12,126 ft. The well was given a daily potential of 203 bbl. of 54.8°-gravity oil a day, based on a 6-hour test through ¼-in. choke. Distillate yield in the 6 hours was 50.75 bbl. Gas-oil ratio was 22,530 cu. ft. and flowing tubing pressure was 3,096 psi.

Geologists were not in accord as to the producing formation, some holding it was still in the Cotton Valley or possibly in a limy section of the Buckner, which overlies the Smackover. Others reported the well in the Smackover limestone.

According to field sources, casing trouble developed very soon after it had been set. The first production test was terminated in about 7 hours when the flow valves were eaten away by the sulfur. It was also said that when closing the well in, four control-head valves were destroyed.

Gas analysis.—Analysis of the gas shows it to be of normal hydrocarbon content, with the exception of hydrogen sulfide, and it is a little high on carbon dioxide. A test made at the well had the following percentages:

Carbon dioxide	4.50
Hydrogen sulfide	42.40
Methane	39.56
Ethane	6.17
Propane	2.89
Isobutane	.92
n-Butane	1.28
Isopentane	.28
Pentane	.30
Hexanes (plus)	.13
	100.00

The above test was on vapors from a 400-psi. separator. Calculated B.t.u. content of the gas was 956, and specific gravity was 0.973. On that test the well was gaged through ¼-in. choke, flowing at the rate of 2,900,000 cu. ft. of gas daily and producing 6 bbl. of distillate an hour.

SULFUR WELL.—Arrow indicates location of the 1 H. L. Puckett with respect to McKamie sulfur-recovery plant and East Texas field.

Sulfur estimate.—If the discovery well maintains its high sulfur content, its yield will be more than double that of Smackover wells supplying sulfur extraction operations in Arkansas. Engineers have estimated sulfur yield from the 1 Puckett may be 15 tons per 1,000,000 cu. ft. of gas.

In McKamie field in Arkansas, one sulfur-extraction unit obtains from 50 to 60 tons of sulfur a day from 1,500,000 to 2,000,000 cu. ft. of hydrogen sulfide. That amount represents some 25,000,000 to 30,000,000 cu. ft. of gas a day from the wells.

Based on calculated production of 3,000,000 cu. ft. daily from the 1 Puckett, and hydrogen sulfide percentage at 47, (CO_2 of 4.5, plus H_2S of 42.4), and assuming a yield of 15 tons per 1,000,000 cu. ft. of gas, its sulfur production would be around 45 tons daily. The amount of hydrogen sulfide gas extracted would be approximately 1,470,000 cu. ft. daily, or nearly equal to the McKamie field extraction plant which serves a number of wells.

Development problems.—Actual operation of the new discovery, however, is not as simple as turning on additional gas. Along with the increase in sulfur content of the gas come additional handling problems, and solving these will be costly.

Conservative gas engineers point out that the well may be producing on a hydrogen sulfide slug, which could thin out under daily flowing. At any rate, it will still be rich, they say, and several chemical and gas companies are eager to obtain the output.

It is thought that a minimum of six wells would be needed to justify an extraction plant, and at this time the total cost has been estimated at $6,000,000.

Development will be slow, due to drilling practice problems, casing and producing procedure yet to be learned, plus the need for geological data on the deeper horizons. Some 26 wells have previously been drilled in the county, none productive, and the deepest formation tested was the Paluxy. The gas-distillate production in the 1 Puckett is East Texas' deepest, and per-well expenditure will be in the neighborhood of $300,000.

Companies involved.—Companies supporting the Rains County venture, or holding acreage in the vicinity, include: Shell Oil Co., Amerada Petroleum Corp., Stanolind Oil & Gas Co., Magnolia Petroleum Co., Humble Oil & Refining Co., Tide Water Associated Oil Co., Seaboard Oil Co., American Liberty Oil Co., Pure Oil Co., Sun Oil Co., Atlantic Refining Co., Federal Royalties, and E. B. Germany.

Gas Tax Agreed Upon

AUSTIN.—The bulk of new income for the State of Texas will come from an increase in the natural-gas severance tax if a compromise bill agreed upon by a house-senate conference committee becomes law.

At a Sunday night meeting the group favored almost doubling the present gas severance tax rate. It would be raised from 5.72 to 10 per cent of the value at the well head if the legislature agrees with the committee.

Also included in the tax bill proposed by the group is an increase in the crude-oil severance tax to 4.6 cents per barrel. The present rate is 4.537 cents per barrel. In addition, the franchise tax paid by corporations would be raised from $1.10 per $1,000 to $1.25.

The tax bill, if adopted, is expected to raise $65,000,000 during the next 2 years and to balance the state budget.

Shafter Pool Shut In

AUSTIN.—Application for a rehearing on an order closing in Shafter Lake Devonian reservoir of Andrews County on June 1 was denied last week by the Texas Railroad Commission. Texas Pacific Coal & Oil Co. and Sinclair Oil & Gas Co. were the applicants.

The commission had ordered the pool shut in until a pressure-maintenance program is initiated to arrest a decline in bottom-hole pressures. All water and gas produced in excess of lease requirements would be returned to the Devonian reservoir. Reservoir pressures have dropped 989

psi. in 2 years to 2,661 psi., commission engineers said.

The per well allowable in the Fullerton pool of Andrews County was cut from 90 to 65 bbl. daily last week by the commission because of a decline in bottom-hole pressure and an increase in gas-oil ratio.

Cut in Output

Texas sets June allowable at 2,939,868 bbl. daily

AUSTIN.—A levelling off in Texas crude-oil production has been ordered by the Texas Railroad Commission.

The commission set the June allowable at 2,939,868 bbl. daily, a cut of 10,810 bbl. from the calendar-day allowable as of May 12 but an increase of 3,545 bbl. daily over the original allowable for May.

Most fields in the state will be allowed 23 producing days for June as compared with 24 for May. East Texas field will be permitted to continue on a 19-day schedule, providing an increase of 8,596 bbl. daily for June—the only increase in the state.

Actually, Texas production will rise slightly during June because of new discoveries and new completions in old fields. Normally, wells in these categories add 40,000 bbl. daily to the state's production by the end of the month.

Humble Oil & Refining Co., Sinclair Oil & Gas Co., and Magnolia Petroleum Co. asked for the 23-day statewide schedule adopted by the commission. Gulf Oil Corp., Eastern States Petroleum Corp., and Texas City Refining, Inc., indicated that they needed more crude than the 23-day schedule would allow. Eastern States said it was eager to sign a 5-year contract which would assure it 15,000 bbl. daily. Joe Brown of Gulf said his company favored a 24-day schedule.

Reduction plea. — Ralph O. Dietler, board chairman of Stanolind Oil Purchasing Co., made a vociferous plea for reduced crude output. He said that crude stocks on May 5 totaled 243,025,000 bbl. for the nation as against 232,832,000 bbl. on March 24. He added that most of this increase was for stocks east of California.

"It is our opinion," Dietler said, "that stock increases of this magnitude cannot continue. Unless current allowables are reduced from 24 to around 21 days, the industry will be faced with serious problems in transporting and storing this continued large volume of production."

The Stanolind representative told the commission that even with 21 producing days, the country's stocks would climb to around 260,000,000 bbl. by the end of 1951.

Commission chairman Olin Culberson replied to Dietler by saying that he would not favor reductions until stocks are up to the level asked for by the Petroleum Administration for Defense. PAD has requested minimum national crude stocks of 250,000,000 bbl.

Nominations.—The 2,939,868-bbl. flow rate for June compares with purchaser nominations of 2,943,059 bbl. daily, up 39,847 bbl. from May. The Bureau of Mines demand forecast of 2,500,000 bbl. is unchanged from April and May.

Estimated natural gasoline and distillate production of 360,726 bbl. for June will lift total permissible flow to 3,300,594 bbl.

The crude allowable, by districts, with change from May 12, is as follows:

District—	June 1 allowable	Change from May 12
1 Southwest Texas	38,403	—131
2 Southwest Texas	171,806	—1,542
3 Gulf Coast	507,141	—3,435
4 Southwest Texas	269,638	—1,862
5 East Texas	55,489	—470
6 East Texas outside	119,401	—966
6 East Texas field	282,506	+8,596
7-B West Central	106,211	—624
7-C West Central	102,377	—729
8 West Texas	983,368	—8,649
9 North Texas	197,539	—996
10 Panhandle	106,419	—2
Totals	2,939,868	—10,810

Golden Anniversary

- Who first used the reflection seismograph?
- When were the principal features of the modern drilling rig introduced?
- What were the legal highlights in the development of a sound conservation program?
- What is the background of secondary recovery?
- Who built the first refinery in West Texas?
- When did cycling become a commercial operation?
- Who built the first big-inch natural-gas line?

These are some of the hundreds of questions which will be answered in the 488-page separately bound supplement to The Oil and Gas Journal's May 31 issue devoted to "Fifty Years of Oil in the Southwest."

The profusely illustrated publication presents men and events having to do with exploration, drilling, production, refining, natural-gasoline manufacture, transportation, natural gas, and all the related operations during a half-century of amazing oil progress in the Southwest.

This oil history is written in concise and yet comprehensive manner based on research work of Journal editors carried on over a period of many months. It will be a reference source for many years.

The number commemorates the fiftieth anniversary of Spindletop and the start of the fiftieth year of The Oil and Gas Journal.

NEXT WEEK

MID-CONTINENT

Water-Flood Success

Oklahoma "stripper" operators now producing 4,000 bbl. daily in 19 projects on 1,645 acres in Washington County

William P. Sterne

BARTLESVILLE, Okla.—How to get the most out of what you have is being taken literally by oil operators in Washington County, Oklahoma, and it is paying off in a big way.

Using secondary recovery by water-flood development of old stripper leases, these heretofore "stripper" operators now have 19 active water-drive projects in operation covering 1,645 acres. These projects produce approximately 4,000 bbl. of oil daily through injection of 58,000 bbl. of water daily.

Several of the projects are being extended and new operations are being initiated. This activity compares with only two water-flood projects in the county in 1942, which produced only 35 bbl. of oil daily from 90 developed acres.

The Oklahoma Corporation Commission, through the first quarter of 1951, has issued permits to flood more than 8,000 acres in Washington County. Last year the total oil production for the county was 1,720,000 bbl., in contrast with 1,076,000 bbl. in 1948. This substantial increase has been principally due to effects of water-flood oil-production operations.

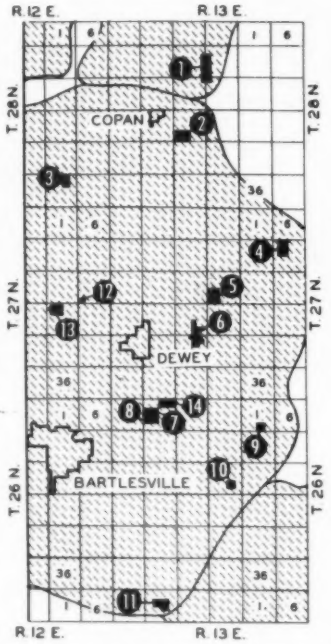
Active projects.—Locations of the 19 active floods (mostly from 500 to 1,300 ft. depth) are shown on the accompanying map. The Sunray Oil Corp. flood has been producing about 670 bbl. of oil daily; Keener Oil & Gas Co.'s flood, 800 bbl. daily; Forrest Oil Corp.'s Flood No. 28, 1,040 bbl. daily; Wellsville Oil Co.'s flood, a new small project, 15 bbl. daily; and Cooperative Refinery Association's project, 385 bbl. daily.

Flood tour.—A large group of water-flood operators and engineers inspected these water floods this week during the first annual inspection tour of representative operations of the Kansas-Oklahoma Water-Flood Operators Committee.

The tour was arranged by engineers and personnel of the U. S. Bureau of Mines' Petroleum Experiment Station at Bartlesville.

Pay sand.—The Bartlesville sand (Pennsylvanian), the formation under flood in Washington County, is thickest and most prolific in Weber pool, where well logs show 75 ft. of sand.

In this area 30 to 50 ft. of the formation is considered oil productive and suitable for water flooding.



WATER-FLOOD PROJECTS.—Location of 14 active water-flooding projects in a portion of Washington County, Oklahoma, 5 of which were inspected this week during the first annual tour of Kansas-Oklahoma Water-Flood Operators. (1) Consolidated Gas, Oil & Mid. Co., and Bird Creek Oil Co.; (2) Barbara Oil Co.; (3) Pilot Oil Co.; (4) Sam K. Goodman; (5) Bruce Oil Co.; (6) Keener Oil & Gas Co.; (7) Hoyt Oil Co.; (8) Winona Oil Co.; (9) Sooner Oil Co.; (10) A. E. Basinger; (11) Morrison Oil Co.; (12) Hoyt Oil Co.; (13) Cooperative Refinery Association; and (14) Sunray Oil Corp.

(A special series of engineering articles by U. S. Bureau of Mines engineers from the petroleum-experiment station in Bartlesville, detailing Washington County, Oklahoma, water-flood projects, will begin in the Journal next week.)

Leases Offered for Bids

WASHINGTON.—The Bureau of Land Management will open bids June 13 for the sale of an oil and gas lease on 160 acres of land in the Hugoton field in Sevens County, Kansas, it was announced this week by the Interior Department.

The lease will be offered on the usual terms of the highest cash bonus, with an annual rental of 25 cents an acre while valuable only for gas but $1 per acre if oil is discovered, and royalties of 12½ to 25 per cent for oil and 12½ to 16⅔ per cent for gas.

CANADA

Alberta's Gas

Dougherty sets reserves at 12.7 trillion cubic feet

EDMONTON.—Potential gas reserves of Alberta were estimated at 12.7 trillion cubic feet, including proved reserves of 8.1 trillion, at a hearing before the Alberta Petroleum & Natural Gas Conservation Board.

The estimate was made by J. F. Dougherty, geologist and petroleum engineer of Dallas, as the board adjourned to September 4 hearings on the application by Canadian Delhi Oil, Ltd., for a permit to export natural gas from Alberta to Montreal over an all-Canadian pipe-line route.

Canadian Delhi is a subsidiary of Delhi Oil Corp. of Dallas.

Longest line.—The gas would be transported east through a $253,000,000 big-inch pipe line by Trans-Canada Pipe Lines, Ltd., which has been granted federal incorporation. The proposed line, 2,240 miles long, would be the longest gas-transmission project in the world.

The adjournment date is the same as that of four other applicants for gas-export permits. They are Prairie Pipe Lines, Ltd., Westcoast Transmission Co., Northwestern Natural Gas Co., and Western Pipe Lines.

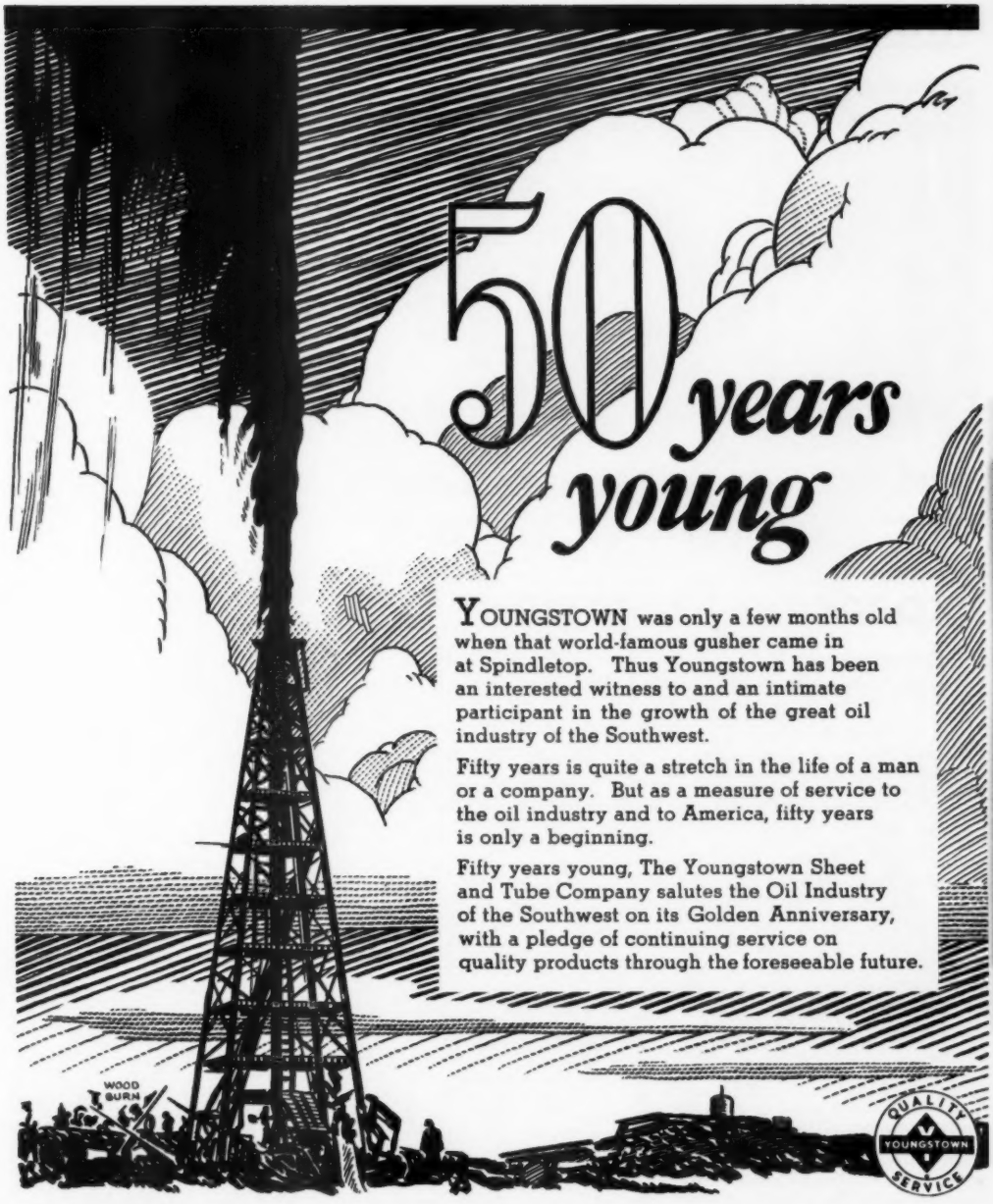
Chairman I. N. McKinnon of the Alberta conservation body asked Delhi officials to submit additional information by early August in order to give the board sufficient time to study the material.

Frank A. Schultz, Dallas, a vice president of Canadian Delhi, said the proposed gas line would serve communities between Alberta and Montreal from the main line with laterals.

Drilling planned.—In connection with the gas supply for the line, Canadian Delhi intends to develop prospects in the Peace River and foothills districts of Alberta and Saskatchewan.

Dougherty testified that the company would require a daily average of 221 million cubic feet of gas during the first year of operation. An average daily delivery of 325 million cubic feet was estimated for the first 5 years.

The totals submitted by Dougherty were: Proved reserves, 8,169,943,000 M.c.f.; undeveloped reserves, 4,501,643,000 M.c.f.; and total proved and undeveloped, 12,671,586,000 M.c.f.



YOUNGSTOWN was only a few months old when that world-famous gusher came in at Spindletop. Thus Youngstown has been an interested witness to and an intimate participant in the growth of the great oil industry of the Southwest.

Fifty years is quite a stretch in the life of a man or a company. But as a measure of service to the oil industry and to America, fifty years is only a beginning.

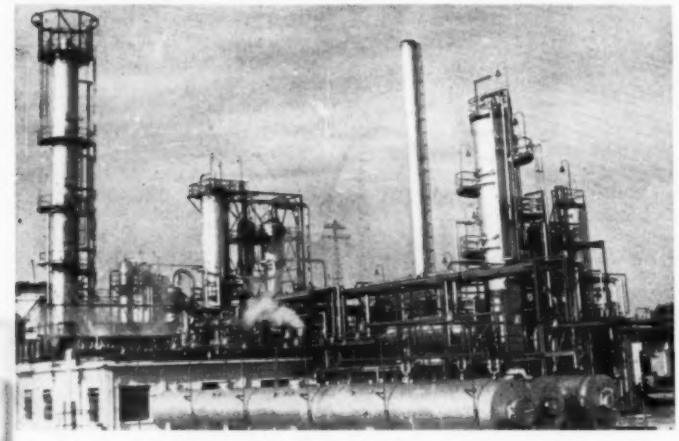
Fifty years young, The Youngstown Sheet and Tube Company salutes the Oil Industry of the Southwest on its Golden Anniversary, with a pledge of continuing service on quality products through the foreseeable future.

Scrap Metal is Critical Again

The Youngstown Sheet and Tube Company

General Offices--Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.



General view of the propane deasphalting and furfural units which have been built at Gravenchon.

Expansion Program

Completion of TCC unit, plant auxiliaries will finish 6-year reconstruction program of two French refineries

Dahl M. Duff

COMPLETION of a Thermofor catalytic-cracking unit early next year and improvement of some plant auxiliaries now under way will finish a 6-year program of reconstruction and expansion of the two refineries of the French affiliate of Socony-Vacuum Oil Co., Inc.

The refineries are those at Notre Dame de Gravenchon, on the Seine River 23 miles above Le Havre in northwestern France, and at Frontignan, between Montpellier and Sete on the Mediterranean Coast in southern France. The operating company is Socony-Vacuum Francaise.

The T.C.C. unit being erected at Frontignan will be one of the first completed modern-type catalytic-cracking units in continental Europe. Its production will assist in reducing the consumption of lead fluid, now in short supply in France, and in maintaining motor-fuel octane at the permitted 69-70 level. Furthermore, the plant will allow the company to keep a better balance with more flexible operations as between light products and fuel oil.

The catalytic cracking unit has a nominal capacity of 10,000 bbl. daily. Construction started last summer by company personnel and local contractors. The new unit, which is of the latest air-lift design, is scheduled to go on stream in the first part of 1952.

Final phase. — Construction of the T.C.C. unit marks a final phase in the rebuilding program under which Frontignan has been enlarged and returned to its original function of light-products production. The plant was severely damaged by bombings preceding the Allied landings on the Mediterranean Coast.

Prewar, Frontignan had a capacity of about 5,300 bbl. daily. It was spared during the early part of the occupation, and some lubricating-oil facilities removed from the other refinery at Gravenchon found their way to Frontignan where they were placed in service. When the plant was repaired with available equipment after the liberation, it was for a time the only plant in France able to produce lubricating oil.

Restored.—The refinery has now been restored except for the shops and some other outside facilities. It is running about 16,000 bbl. daily with a capacity to charge up to about 21,000 bbl. daily. As lubricating-oil equipment was brought back in operation at Gravenchon, these operations were discontinued at Frontignan.

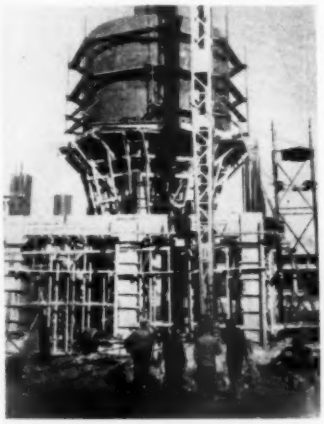
The Frontignan refinery formerly was operated by Cie. Industrielle des Petroles. This company and Socony-Vacuum's three other French refining and distribution companies, including Raffineries de la Vacuum Oil Co., S.A.F., which operated the Gravenchon plant, were merged into Socony-Vacuum Francaise early in 1949. At Frontignan, the postwar-improvement program included the construction of a 9,200-ft. submarine-unloading line for crude, which was the first in Europe *(The Oil and Gas Journal, May 5, 1949, page 45)*.

Gravenchon facilities. — Socony-Vacuum's other French refinery at Gravenchon is now back on its prewar basis of primarily producing lubricating oil. Its throughput is about 12,000 bbl. daily in comparison to its prewar rating of 5,500 bbl. daily. Present capacity is 17,000 bbl. daily.

A rebuilt methyl-ethyl-ketone dewaxing plant, improved with some new equipment, went back on stream in February. The cracking unit used for topping, the reformer, distillation unit, and other processing equipment have been fully placed back in service. The powerhouse has been rebuilt and modernized, and a new compounding and blending plant of the latest design, including Stratford grease-making equipment, has been constructed. The old Duo-Sol unit has been modified into propane deasphalting and furfural extraction.

Scattered. — The Gravenchon plant was scattered throughout Europe as a result of removals carried out by the Germans in 1943 and 1944. The vacuum tower of the distillation unit, for example, was recovered in Czechoslovakia. The looted units were patiently tracked down and returned to the plant site as far as possible.

The Gravenchon refinery is located adjacent to the Port Jerome plant of Standard Francaise des Petroles. Both refineries are supplied with crude through a pipe line from tanker docks at Le Havre.



The partly erected kiln for the T.C.C. unit now going in at Frontignan.

DRILLERS TO THE INDUSTRY

FLEET

DRILLING COMPANY

Ada, Oklahoma • Dallas, Texas

Climbing Production

World crude output in March reaches 11,542,000 bbl. daily; 1.4 per cent gain over February's all-time high

Dahl M. Duff

WORLD-WIDE production of crude oil showed another sharp increase in March, mainly as a result of the all-time high output of the United States.

The increase over February was 1.4 per cent, the largest month-to-month gain since last October. The upward trend in world production which began a year ago is continuing at a rate exceeding some of the most optimistic forecasts made in the industry.

Total production in March, foreign and domestic, was approximately 11,542,000 bbl. daily. The increase over February was approximately 154,000 bbl. daily.

As has been the case in most of the preceding 6 or 7 months, the United States contributed the majority of the increase. Domestic production was estimated at 6,047,000 bbl. daily, up 117,000 bbl. daily. The net change in production in foreign countries represented a gain of 37,200 bbl. daily.

TREND OVER LAST YEAR

1950	Western Hemisphere less U. S.	Middle East	Total foreign less Russia and E. Europe
April	1,968.2	1,639.5	3,812.9
May	1,775.4	1,752.0	3,847.4
June	2,098.2	1,811.5	4,229.6
July	2,073.2	1,808.3	4,202.6
August	2,097.8	1,839.5	4,273.6
September	2,146.1	1,803.7	4,297.1
October	2,185.7	1,893.2	4,428.9
November	2,213.8	1,899.1	4,474.1
December	2,213.6	1,988.9	4,563.0
1951			
January	2,210.9	1,874.2	4,450.9
February	2,220.3	1,947.4	4,536.8
March	2,248.3	1,960.4	4,574.0

The world daily average output in March represented a production nearly 21 per cent over March 1950. This tremendous gain over a 12-month period is virtually unprecedented, even in an industry which is accustomed to large-scale expansion.

To some extent, the increase over a year ago is due to the somewhat depressed level of production at that time. This is especially true in the United States, where production in March of this year was 24 per cent over March 1950. Total foreign production, exclusive of Russia and Eastern Europe, was up 19.4 per cent over the year-earlier month.

Western Hemisphere. — Venezuelan production in March established its seventh consecutive monthly record. Output in this country in March was 1,678,400 bbl. daily, up 42,400 bbl. daily over February.

The other principal change in production among countries of the Western Hemisphere was in Canada, which showed a drop of about 18,000 bbl. daily. Canadian production is prorated to outlets, and March was prior to the beginning of shipments from the Superior, Wis., terminus of the Interprovincial pipe line. Crowded storage facilities caused March cutback in Canada. Some estimates are that Canadian production may reach nearly 150,000 bbl. daily later in the summer.

Weekly reports on production in Venezuela during March showed a continuous upward climb. During the weeks ended March 5, 12, 19, and 26, output in Venezuela was 1,669,645 bbl. daily, 1,671,793 bbl. daily, 1,672,613 bbl. daily, and 1,682,500 bbl. daily. The latter figure represented the highest weekly production in Venezuela to that date.

Venezuelan government figures,

WORLD CRUDE-OIL PRODUCTION
(Thousands of barrels daily)

Country—	March 1951	Feb. 1951	March 1950
Western Hemisphere:			
Argentina	68.0	66.7	66.4
Bolivia	1.5	1.5	1.6
Brazil	1.3	1.3	1.3
Canada	76.1	94.1	77.7
Chile	1.7	1.7	1.5
Colombia	107.6	108.4	87.0
Cuba	0.3	0.4	0.3
Ecuador	7.3	7.5	7.2
Mexico	207.2	204.0	188.7
Peru	42.5	42.4	39.8
Trinidad	56.4	56.3	57.0
Venezuela	1,678.4	1,636.0	1,386.6
Total	2,248.3	2,220.0	1,915.1
Europe and Africa:			
France	5.0	4.8	1.4
French Morocco	0.9	0.9	0.8
Germany	24.0	24.0	20.6
Italy	0.1	0.1	0.2
Netherlands	15.3	14.0	14.8
Egypt	40.3	45.5	42.6
United Kingdom	0.9	0.9	1.0
Total	86.5	90.2	81.4
Middle East:			
Bahrein	30.0	30.6	29.8
Iran	700.1	704.6	706.5
Iraq	169.8	170.5	113.1
Kuwait	375.4	358.8	311.6
Qatar	45.8	48.8	34.3
Saudi Arabia	638.9	633.7	411.5
Turkey	0.4	0.4	0.6
Total	1,960.4	1,947.4	1,607.4
Other Asia:			
British Borneo	105.0	105.0	75.7
Burma	2.0	2.0	0.5
China	2.2	2.2	1.5
India	5.0	5.0	5.3
Indonesia	150.0	150.0	131.3
Japan	6.0	6.1	5.3
New Guinea	4.8	4.9	4.7
Pakistan	3.8	3.7	2.6
Total	278.8	278.9	226.9
Total, foreign less Russia and E. Europe	4,574.0	4,536.8	3,830.8
Estimated Russia and Eastern Europe:			
Austria	27.0	27.0	22.0
Romania	80.0	80.0	82.0
Russia	790.0	790.0	730.0
Other E. Europe	24.1	24.1	20.9
Total	921.1	921.1	854.9
Total, foreign	5,495.1	5,457.9	4,685.7
United States	6,047.0	5,930.0	4,878.8
World total	11,542.1	11,387.9	9,564.5

Figures are from reliable reports in the industry or offical government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Completely current reports also are lacking for certain areas of Southeast Asia.

from the Technical Office of Hydrocarbons, showed the following output by individual companies during February and March:

	March	February
Creole	765,107	751,502
Shell	509,166	509,723
Mene Grande	246,132	223,008
Socony-Vacuum	46,318	45,171
Texas	23,986	25,330
Mercedes	22,222	22,221
Atlantic	20,795	20,350
Sinclair	11,872	11,309
Pantepec	10,294	10,408
Richmond	15,367	10,278
B.C.O.	6,225	5,693

Colombia's crude production dropped off slightly from the record level of the preceding month. Production by concessions during March was: De Mares 37,492 bbl. daily (exclusive of 2,289, bbl. daily condensate), Barco 28,631, Yondo 36,676 bbl. daily, Cantagallo 1,304 bbl. daily, Dificil 2,311 bbl. daily, and Velasquez 1,233 bbl. daily.

Middle East. — In the Middle East, production in March was only slightly below the record of 1,989,000 bbl. daily during last December. The strikes and partial shutdown in the field and refinery areas of Anglo-Iranian Oil Co., Ltd., did not occur until April, and Iran's March production reflected normal operations with a daily average of slightly above 700,000 bbl. daily.

Kuwait's production was up nearly 17,000 bbl. daily from the somewhat low output in this area during the previous month. A slight increase also was reported by Arabian American Oil Co. in Saudi Arabia during March.

Europe.—Of interest is the fact that the relatively small production of metropolitan France rose to an estimated 5,000 bbl. daily during March. Though still only a small part of the country's requirements, French crude production has shown an approximately four-fold increase over the last year. The gain is due to the development of Lacq field in southwestern France, along with slight increases in production in the old Pechelbronn area.

MIDDLE EAST

Iran Slows Up

Commission hesitates to seize Anglo-Iranian properties; public opinion still inflamed; British send new protest

IRANIAN Government leaders appear to have decelerated somewhat their headlong rush to expropriate the properties of Anglo-Iranian Oil Co., Ltd.

Failure of the government commission to make some active attempt to seize control of the company's operations gave rise to slight hope that the issue may be settled with major concessions by the British.

Public opinion inflamed. — However, the situation was still touch-and-go, and there was considerable doubt that Iran's politicians could now permit any satisfactory compromise in view of the continued inflamed state of public opinion in the country. In fact, the violently nationalistic government was denounced in Teheran last week for failing to include Bahrein in its oil nationalization program.

Recent developments in connection with the oil nationalization have all been on a high government level and involve major questions of international policy on the part of both the British and the United States governments.

British note.—The British Government sent a new note to Iran asserting again that Britain could not accept arbitrary cancellation of a concession which does not expire until 1993. The British contend this action is illegal.

The note warned Iran of "serious consequences" if it applied its oil nationalization law. The note made no mention of the use of military forces, but said the British Government would have the right to make a complaint against Iran before the International Court of Justice.

The British pointed out the 1933 contract between Anglo-Iranian and the Iranian Government provided that the company's position could not be changed during the life of the concession except by agreement, and there were clauses setting forth methods of arbitrating any disputes.

The British Government pointed out it owns a majority of the shares of the company, and offered to send a mission to Teheran to negotiate a new agreement.

Arbitration rejected. — Iran rejected the earlier request of Anglo-Iranian to arbitrate the dispute, and told the company to appoint a representative to assist the government in taking over the properties. The government gave no indication of willingness to yield on its nationalization plan, but it was the first time the company has been asked by the government to sit down and discuss details of the nationalization.

Some form of state oil operation seems almost certain to emerge out of the present difficulties in Iran. What is uncertain is the degree of participation, if any, the British will have. Summary dispossession of the company such as the Iranians intend could lead to severe economic sanctions by Britain.

Iran, though apparently not too concerned with the legality, contends nationalization is a sovereign right, and furthermore, that the 1933 agreement was signed under duress during the regime of a dictator.

Prior to the dispatch of the new note, it became known that Britain had alerted a brigade of three battalions of parachute troops, presumably for service in Iran. This news caused widespread excitement, but later the information was generally regarded as an "inspired leak" from the War Office in London.

The British continued to seek support of the United States in the controversy. In Washington, Secretary of

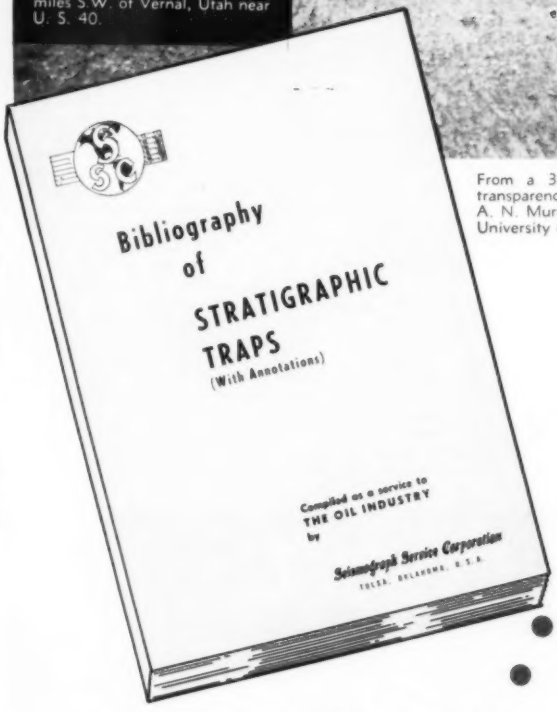
At the Foot of the Steepest Inch

This is the bulk plant of Creole Petroleum Corp. at Catia de la Mar, 10 miles down the mountain from Caracas. In the background may be seen a tanker discharging its products cargo, which will be pumped through the line to Caracas. The line, a joint project of Creole and Shell Caribbean Petroleum Co., has grades as steep as 60 per cent along its short run to the Venezuelan capital.

Looking For STRAT-TRAPS?

A channel sandstone in the upper part of Duchesne River formation (Oligocene) about 5 miles S.W. of Vernal, Utah near U. S. 40.

From a 35mm. Kodachrome transparency—Courtesy of Dr. A. N. Murray, Dept. of Geol., University of Tulsa.



Seismograph Service Corporation takes great pleasure in announcing the above bibliography. Its gratis distribution is another example of SSC's unexcelled service to the Oil Industry.

THE GEOLOGIST

In view of the increasing importance of Stratigraphic Traps in the search for oil the geologist may wish to review the pertinent literature.

THE GEOPHYSICIST

The geophysicist may wish to reacquaint himself with the various types of Stratigraphic Traps and their possible geophysical expressions.

Seismograph Service Corporation

Seismic Surveys — Gravity Surveys — Pilot Crews — Lorac

TULSA, OKLAHOMA, U.S.A.

State Acheson at a press conference urged both sides to avoid taking extreme steps and asked that they act with moderation. His remarks were coolly received in London where officials had hoped he would take a firmer and more definite stand.

American operation rumored. — Reports still circulated in this country that certain American interests have approached the Iranian Government with offers to operate the properties when they are taken over. Acheson at his conference said he knew of no such offer, or of any plan for this country to provide technicians if the British were forced out.

There were indications, however, that if any offers have been made they have not come from major companies. The big companies are reported to feel that the job could be handled only by big-time interests which do not have spare capacity in the way of tankers, technicians, etc., which it would require. Companies which now have extensive operations abroad are said to be encountering difficulties in recruiting technical staffs for even established operations.

Operations normal.—While this governmental maneuvering was going on, Anglo-Iranian continued to operate normally in its concession area. Company-government negotiations would come presumably only after the way was opened on the government level. A responsible official familiar with the situation pointed out last week that the hysteria in Teheran was such that absolutely nobody in authority would dare talk to company representatives.

The government's liquidation commission continued its deliberations in Teheran. The possibility that the Iranians may come to terms was strengthened by reports that some of the commission members favor a plan under which production would be exclusively Iranian, refining temporarily a joint Iranian-British operation, and shipping and marketing exclusively British.

Haifa resumption.—There were fresh rumors last week that the 83,000-bbl. daily Haifa refinery of Consolidated Oil Refineries, Ltd., may be returned to full operation with some of its production again exported. This, however, appeared unlikely unless there is a new shutdown at Abadan. Similar rumors in the past have originated more in Israeli hopes than on any factual basis.

Pipe line shelved.—Earlier indications that the Middle East Pipelines, Ltd., project for a large-diameter line from Iran to the Eastern Mediterranean has been indefinitely shelved were given further substance by reports that mill orders for the pipe have been indefinitely postponed.

This occurred before the trouble developed in Iran, but the prospective nationalization makes it even more unlikely the line will be built as planned.

Russian intervention? — The whole Middle East situation, meanwhile, got a new jolt with reports that the Russian ambassador at Teheran had offered Soviet support if Iran makes an effort to recover Bahrein Island as demanded by the nationalist party. Officals in Washington, however, expressed little concern, pointing out that Iran has been talking about Bahrein for decades and questioning what steps it could take now to annex the island.

Israeli Exploration Rumored

Unidentified American companies are reported to be discussing possible exploration work in Israel with the Israeli Government.

Max Ball, Washington consulting geologist and former head of the Interior Department's Oil and Gas Division, was engaged by the Israeli Government and has turned in a report pointing out the prospects of seven areas, mostly in the southern part of the Negeb Desert.

Iraq Petroleum Co., Ltd., holds concessions by permit areas or blocks in parts of Israel. Its exploration rights were obtained from the former British-mandated government of Palestine, now Israel. I.P.C.'s associated Palestine company started drilling a well in the Negeb area several years ago but was forced to discontinue operations because of disturbances in the country. Parts of the rig are understood to be still at the location.

Exploration Rights Offered

United States oil companies are being offered exploration rights in the Province of Dhofar in the Sultanate of Muscat and Oman in the southeastern part of the Arabian Peninsula.

The ruling sultan is inviting American companies to take exploration concessions for up to 2 years in duration, and is promising fullest cooperation possible. Inquiries are to be directed to the United States consulate general at Dhahran in Saudi Arabia.

Iraq Petroleum Co., Ltd., organization holds a concession covering parts of the Muscat and Oman Sultanate, but has relinquished the Dhofar area. Through its associated companies, I.P.C. has rights over other sheikdoms on the Trucial Coast and in Hadhramaut. No drilling has been done in Muscat and Oman.

Syria Extends Invitation

WASHINGTON.—An invitation to investigate the possibilities of oil operations in Syria has been extended to American companies by the Syrian government through the State Department.

Syrian Minister Faiz El-Khouri explained that Syrian Petroleum Co., a subsidiary of Iraq Petroleum Co., which now holds a concession, is withdrawing from the field, leaving available oil and gas deposits in an area near the Iraq border.

There has been no production by I.P.C., although the concession is close to large deposits in Iraq. Failure of the company to find oil has been a sore point with Syria, although I.P.C. has said it has spent large sums looking the area over without any luck.

FAR EAST

Sumatran Activity

Caltex affiliate adding to Far East oil reserves

A SUBSTANTIAL contribution to Far East oil reserves has been made as a result of development work carried out in central Sumatra during the last 2 years by Nederlandsche Pacific Petroleum Mij., a Caltex affiliate.

Reserves blocked out thus far in the program *(The Oil and Gas Journal, October 26, 1950, page 65)* are now estimated at between 60,000,000 and 100,000,000 bbl. Most of these are in Minas field with minor amounts in the Doeri and Sebanga areas.

Shipments in 1952.—N.P.P.M. recently completed its fourteenth well in Minas, and is building a 12-in. pipe-line outlet to the Siak River. The company expects to begin shipping commercially from its Indonesian concession, about the middle of next year.

Each of the 14 wells completed in Minas is considered to be good for about 1,000 bbl. daily. The crude is 36° gravity with about 20 per cent wax. Caltex has an interest in the 6,000-bbl. daily plant of Bitumen & Oil Refineries at Sydney, Australia, but the Sumatran production is expected to go into general trade in the Far East. There are no present plans for construction of a refinery in the area.

Rigs operating.—N.P.P.M. is operating two rigs on its central Sumatra concession. One is extending Minas field. The second recently commenced an exploratory well on the Pungut structure about 18 miles northwest of Minas. Earlier plans to test an area about 20 miles southwest of Pakanbaru have been deferred.

Minas, discovered prewar, is situated about 25 miles from Pakanbaru, a town at the navigation head of the Siak River. The company resumed its operations in Sumatra in January 1949.

PERSONALS

New Title

Seger elected president of Interstate Pipe Line

JOSEPH L. SEGER, executive vice president of Interstate Oil Pipe Line Co., affiliate of Standard Oil Co. (N.J.), was elected president of the firm last week. He succeeds Loren F. Kahle, who resigned to assist W. R. Finney, pipe-line adviser of Jersey Standard in New York.

A resident of Tulsa since boyhood, Seger entered law practice there in 1929 after graduation from University of Illinois and Yale Law School. Four years later he joined the legal department of Carter Oil Co., also a Jersey Standard affiliate, and in 1944 he was elected secretary.

He joined Interstate as general counsel in 1946 and became vice president and general counsel the following year. In 1949 Seger was elected executive vice president, and became acting head of the firm when Kahle was granted a leave of absence.

L. F. KAHLE

Loren F. Kahle has resigned as president of Interstate Oil Pipe Line Co., affiliate of Standard Oil Co. (N. J.), to assist **W. R. Finney**, pipe-line adviser of Jersey Standard in New York. Kahle was granted leave of absence from Interstate in October 1949 to direct construction and help draft operating plans for Interprovincial Pipe Line Co.'s line recently completed from Edmonton, Alta., to Superior, Wis. He also will resign as executive vice president of Interprovincial, but will remain a director of Interstate. He was reared in Oklahoma City, and attended Iowa State College. Kahle joined Jersey Standard in 1924. From 1925 to 1935 he served with the firm's affiliate in Mexico. He was transferred to the Jersey Standard Venezuelan affiliate in 1935 as chief engineer in charge of construction. In 1941 he became superintendent of the firm's terminal at Caripito. During World War II, Kahle worked with the U. S. Navy in Panama, advising on the construction of pipe lines across the isthmus. He moved to Tulsa in 1943 as superintendent of petroleum transportation of Carter and a year later was chosen vice president of Interstate. He was elected president in 1945.

G. Davidson, of the New York head office manufacturing department, Shell Oil Co., has been transferred to Montreal as refinery manager for Shell Oil Co. of Canada, Ltd., during the temporary absence of **Dr. D. M. Morrison,** who is serving as chief of refining in the petroleum division of Canada's department of defense production.

John G. Hauck, formerly a mechanical engineer at Esso Standard Oil Co.'s Bayway refinery, has been promoted to assistant regional engineer.

J. D. Crothers, of Shell Oil Co. of Canada, Ltd., has been appointed division engineer of the Toronto division. His former assignment was engineer in the head office engineering department.

Bill Hudson has been transferred by The California Co. to Ardmore, Okla., as district geologist in charge of the southern Oklahoma activities for the firm. **Charles Ramsden,** who was recently transferred to Denver, has been made district geologist with the company at Denver.

C. F. Cogan, junior mechanical engineer for Shell Oil Co. at Midland, Tex., has been transferred to the New Orleans area. Other transfers in the firm include: **E. L. Emmel,** junior exploitation engineer, from Houston to Odessa, Tex.; **W. J. Fairbanks,** junior mechanical engineer, from Houston to Midland; **K. W. Foster,** junior mechanical engineer, from Midland to the New Orleans area; **C. R. Reiter,** junior mechanical engineer, from New Orleans to Midland; **F. W. Stewart,** drilling foreman, from Odessa to Calgary, Canada; **R. L. Warden,** junior mechanical engineer, from Houston to Odessa; **W. T. Weller,** junior mechanical engineer, from New Orleans to Midland; and **T. C. Zacher,** junior geologist, from Houston to Midland.

Fletcher Farrar, formerly general superintendent in charge of field operations for Joe Slivka & Son, independent operators at Mount Vernon, Ill., has resigned and will open offices there June 1 as an independent consulting geologist and engineer. A graduate of University of Oklahoma with a degree in petroleum engineering, Farrar has had 6 years of experience in the Illinois area with The Texas Co. and Slivka.

Roland Hales, who has been manager for Anglo-Egyptian Oil Co., Ltd., in Egypt, is now visiting oil centers in the United States. Effective September 1 he becomes general manager of Sarawak Oilfields, Ltd., and British Malayan Petroleum Co., Ltd. These Shell companies' operations center in Brunei and Sarawak.

Donald I. Lawless has been promoted to chief geologist for Bishop Oil Co.'s Mid-Continent area. Lawless was formerly with El Dorado Refining Co. and Bridgeport Oil Co. He has been with Bishop for the past 3 years.

E. F. H. Pennekamp, Standard Oil Development Co., has been appointed to a new company assignment dealing in aviation problems and research and liaison with the aviation industry.

B. S. WATSON

Burl S. Watson has been elected executive vice president of Cities Service Oil Co. **Emil Schram,** former president of the New York Stock Exchange, has been elected to the board of directors of the firm. Watson has been associated with Cities Service since 1917. For many years he was assistant to **W. Alton Jones,** president of the company. He became a vice president in 1940 and held offices in various Cities Service subsidiary companies. Prior to becoming president of the New York Stock Exchange, Schram was chairman of the board of Reconstruction Finance Corp.

J. G. McMillian, W. O. Keller, and **L. F. Peterson** have dissolved the partnerships of McMillian & Peterson and of McMillian, Keller & Peterson, of Midland, Tex. Both firms had functioned as independent oil operators and as consulting engineers. McMillian will work individually as an independent oil operator in Midland, and Keller and Peterson will continue to maintain their offices in Midland and will work as consulting engineers and independent oil operators.

PERSONALS

Fred H. Haggerson, president of Union Carbide & Carbon Corp., has been elected chairman of the board of directors. He has been president of the firm since 1944 and has been with the corporation for over 30 years.

DAVIS

Flavy E. Davis has been appointed chief geologist for American Republics Corp. at Houston, replacing **R. M. Beatty,** who has resigned. He will coordinate activities in the geological and geophysical divisions under the general supervision of the manager of the exploration department, **J. P. Black.**

George Taylor, engineer in the Corpus Christi, Tex., office of the oil and gas division of the Texas Railroad Commission, has resigned to join the geological staff of Humble Oil & Refining Co. at Houston.

Claude B. Hamill will open an exploration office in Midland, Tex., for operations in the Midland Basin. **Robert Doyle,** formerly geologist with Shell Oil Co., will be division manager and head the geological department, and **Harris Houston** will head the land department.

Roy Jerrell, plant foreman for Tennessee Gas Pipe Line Co., has been transferred from East Bernard, Tex., to Agua Dulce, Tex. He replaces **Oscar Howard,** who has been transferred to Victoria, Tex.

Barclay Van Dyke, administrative assistant to Shell Oil Co.'s regional vice president at Houston, has been transferred to New York as staff assistant to **A. J. Galloway,** vice president.

Richard W. KixMiller has been named assistant general manager of the chemicals division of Celanese Corp. of America. **Kenneth D. Bacon,** plant manager at Bishop, Tex., will continue in that post and assume the additional responsibility of manager of plant operations of the chemical division. **John H. Frick** has been named plant manager of the new chemical plant to be built at Pampa, Tex. Also moving to the Panhandle plant site are **J. B. Phelps** and **Robert Clark,** as production superintendent and resident engineer, respectively. **William Orr** becomes production superintendent at Bishop, replacing **Vincent Anwyll,** who is now manager of the Edmonton, Alta., plant to be erected by Canadian Chemical Co., Ltd., an affiliate of Celanese. **David Keck,** formerly of the Bishop staff, is to be assistant plant engineer at Edmonton. **H. K. Busch** has been promoted to assistant production superintendent at Bishop, and **Barney C. Martin** succeeds Orr as superintendent of the formaldehyde unit. **S. T. Ross** replaces Busch as superintendent of the products-purification unit and **Joseph Neely** succeeds Phelps as superintendent of the acetic-acid unit.

Howard F. Bell, district mechanical engineer for Pan American Pipeline Co., has been transferred from Dallas to Houston.

Joseph Swartz, geologist for Sun Oil Co., has been transferred from Billings, Mont., to Casper, Wyo.

F. A. C. Guepin has been elected a director of Shell Oil Co. He joined the firm in 1929 and served with affiliated companies until 1937, when he became executive vice president of Shell on the Pacific Coast. In 1939 when the operating companies were merged, Guepin went to St. Louis as senior vice president, moving to New York in 1940 when the headquarters for East of Rockies operations was established there. In 1945 he went to London, where he assumed charge of marketing operations in Europe. In 1950 he was appointed managing director of Anglo Saxon Petroleum Co., Ltd., Shell Petroleum Co., Ltd., Batavian Petroleum Co., and Royal Dutch Petroleum Co. He is also chairman of the board of Shell Chemical Corp.

Howard E. Abernathy, tool pusher for Dunbar Drilling Co., has been transferred from Salem, Ill., to Denver.

Robert B. Beattie, of Plainfield, N. J., has been appointed assistant superintendent of the mechanical department at the Bayonne, N. J., refinery of Tide Water Associated Oil Co. Beattie was employed by the firm in 1930 as a development engineer in the refinery laboratory.

Dr. George Granger Brown has been appointed dean of the College of Engineer at University of Michigan, effective July 1. Brown, who has been on the faculty since 1920, will succeed **Dr. Ivan C. Crawford,** who is retiring to return to private practice as a consulting engineer. In 1949 Brown was named director of the U. S. Atomic Energy Commission's Division of Engineering with responsibility for the chemical engineering phases of the commission's reactor development program. He has served many years as a special consultant for industry, chiefly in the petroleum and automotive field.

N. Bruce Calder, petroleum engineer for Woodward & Co., has been transferred from Goldsmith, Tex., to Dallas.

Paul B. Leavenworth, formerly chief geologist for the Houston district of Gulf Oil Corp., has joined Housch Drilling Co., Houston.

Ira Stein, who has been in charge of Bridwell Oil Co.'s offices at Alice, Tex., for several years, has been placed in charge of the newly created geological office of Chicago Corp. at Abilene, Tex.

Harry K. Sutherland has been appointed assistant director of Shell Oil Co.'s agricultural laboratory at Modesto, Calif. He has been with Shell for over 12 years, starting as a research chemist for Shell Development Co.'s Emeryville, Calif., laboratories.

F. H. LERCH, JR.

F. H. Lerch, Jr., president of Consolidated Natural Gas Co. since its organization in 1943, has been elected chairman of the board. **J. French Robinson** has been elected president of the firm, succeeding Lerch. **James Comerford** has been elected executive vice president of the firm, and **Herbert C. Johnson** elected treasurer. **Arthur E. Gartner** has been appointed assistant treasurer, and **John Miller,** assistant secretary of the company.

J. F. ROBINSON

J. COMERFORD

Lerch started in the natural-gas business in 1920 with Ford, Bacon & Davis. From 1927 to 1934 he was resident manager of Interstate Natural Gas Co., Inc., a Standard Oil subsidiary in Louisiana. From 1934 to the organization of this company, he served as coordinating head of all natural-gas interests of Standard Oil Co. (N. J.). Robinson comes to Consolidated from its subsidiary, East Ohio Gas Co. He was president of this firm from 1940 to April of this year, when he became its chairman. He joined the natural gas subsidiaries of Standard Oil in 1921 as geologist for

REED
Liquid-blast
ROCK BITS

"I'm proud of the runs these bits gave us"

...Says L. E. Voss, tool-pusher for a prominent Gulf Coast drilling contractor.

Mr. Voss says, "We ran into some mighty hard formations in the Hamshire Field near Beaumont after setting 7" casing, but we made better than average hole with **REED** 2H and 2HS-1W Rock Bits."

S. R. Trammel, driller under Mr. Voss, is a strong booster for **REED** Rock Bits.

REED Liquid-Blast Rock Bits drill hard formations efficiently because jets of drilling fluid quickly wash broken formation from the bottom of the hole. As a result, cutters are always working on new formation—making for fast drilling and good long runs.

For good long runs use the **REED** *"LB"*

REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

NEW YORK LONDON BUENOS AIRES

2784

PERSONALS

Peoples Natural Gas Co. and was president of that firm from 1936 to 1940. Comerford served with the natural-gas interests of Standard Oil from 1919 to 1943. Since then he has been treasurer and director of Consolidated.

R. H. Anderson, formerly district production superintendent at Morganfield, Ky., for Sun Oil Co., has been transferred to Toledo, Ohio.

C. J. Montgomery, Jr., assistant to the chief civil engineer of Tide Water Associated Oil Co. with headquarters at Houston, has resigned to open his own offices as a consulting engineer. He has been associated with Tide Water's civil engineering department since 1935.

Kenneth P. Pricer, formerly of Great Bend, Kans., has joined Phillips Petroleum Co.'s geological staff at Oklahoma City.

J. E. Kline, Standard Oil Co. (Indiana) has been elected chairman of the Chicago section of the Society of Automotive Engineers. Other officers include: **Robert C. Wallace,** vice president; **Lloyd F. Overholt,** secretary; and **David C. Peterson,** treasurer.

Gene Green, Cabot Carbon Co., Pampa, Tex., has been elected president of the Panhandle Producers & Royalty Owners Association. Other officers elected are **O. Dale Smith,** Amarillo, vice president; **William Davis,** Pampa, treasurer; and **F. V. Wallace,** Shamrock Oil & Gas Corp., reelected secretary.

Sheldon Clark, chairman of the executive committee, has been elected chairman of the board of directors of Sinclair Oil Corp. Clark has been an officer of the corporation almost from its inception. He will withdraw from marketing activities and act in the capacity of assistant to the president, **P. C. Spencer. Henry L. Phillips,** president of Sinclair Oil & Gas Co., and **Ernest L. Hughes,** vice president in over-all charge of marketing activities, were elected vice presidents of the parent company.

G. S. Hanna, manager of the petroleum procurement department of British American Oil Co., Ltd., Toronto, has been granted a leave of absence to head the supply and transportation section of the refining department in Canada's newly created petroleum division of the Department of Trade and Commerce.

Jack Miller, 1950 graduate of Indiana University, is now a geologist for Cline & Lambert Drilling Co. at Mount Carmel, Ill.

William H. Irons, formerly production superintendent for **J. B. Buchman** at Evansville, Ind., has joined Ashland Oil & Refining Co. at Shreveport, La., as division production superintendent.

Richard W. Thompson, Jr., petroleum engineer for **G. W. Strake,** has been transferred from Wichita Falls to Winters, Tex.

Harold F. Blake has been named general foreman of the newly consolidated motor oil, solvents, and asphalt packaging unit at Esso Standard Oil Co.'s Bayonne refinery. **Robert Voss** was appointed his assistant.

Herbert Minich, of Esso Standard Oil Co.'s technical service division, has been elected president of the Esso Research Club, Linden, N. J.

W. T. Stevenson, executive vice president of Texas Gas Transmission Corp. since it was organized in 1948, has been elected president of the firm. **J. H. Hillman, Jr.,** formerly president and chairman of the board, will continue as board chairman.

Leo A. Castler has been promoted to project engineer in the engineering department of General Petroleum Corp. He has been with the firm since 1943.

Glenn W. Sandberg has been transferred from San Antonio to Denver as district geologist covering the Denver basin and the Dakotas for Sunray Oil Corp. **T. W. Lins** has been appointed district geologist of the Casper, Wyo., district, covering Wyoming and Montana.

Robert Flanagan, formerly Houston independent oil operator, has joined the Department of Defense as a consultant.

John Deuth, geologist for Continental Oil Co., will be transferred from Evansville, Ind., to Wichita, Kans., June 1.

Don D. Bills, geologist with Cities Service Oil Co. at Olney, Ill., has been transferred to Billings, Mont.

Jim Kendall has joined Lohmann-Johnson Drilling Co. at Evansville, Ind., as geologist.

H. A. Gidney, director and executive vice president of Gulf Oil Corp., retired from all his official positions May 21 after more than 31 years with the Gulf companies. He began his career as a clerk with Tenney Service Cos., a public-utilities group. After 19 years with that organization, he joined Gulf in January 1920, becoming chief accounting officer in that same year.

Charlie Wallen, for the past 2 years division production superintendent for Continental Oil Co. in the Indiana area, has been transferred to Ponca City, Okla., as production superintendent for Oklahoma and Kansas.

Joe Travis, formerly geologist for Barnsdall Oil Co., is now in charge of a new office at Midland, Tex., for Ryan, Hays & Burke.

Dent N. Hand, secretary-treasurer of Bay Petroleum Co. at Denver, has resigned and will move to Casper, Wyo., on June 15 to join Ajax Oil Corp. and affiliates. He had been with Bay for 13 years.

DEATHS

W. B. Wilson, 65, formerly chief geologist for Gulf Oil Corp., died May 21 at Hartford, Conn. He was chief geologist for the Tulsa division of Gulf for over 25 years and was made consulting geologist in 1945, holding that position until his retirement last year.

David Barr, 89, died at London recently. A Petrolia, Ont., driller, about 1905 he became manager of Beaver Oil & Gas Co. in Moore field, and was also president of the Petrolia Torpedo Co., nitroglycerin manufacturers.

Robert Chalmers Wetmore died May 10 in Kansas City. He had been office manager for Standard Oil Co. in Kansas City before he retired 13 years ago. He had been with Standard 40 years.

Thomas R. Jones, 60, founder and first president of Oklahoma Contracting Co., died May 20 in Dallas. After 32 years as president of the firm, Jones took a vice presidency in 1949. In 1947 he helped organize and was elected first president of the Pipeline Contractors Association.

J. H. Hilt, 69, prominent oil man, died in Wichita, Kans., recently.

Cecil L. Adcock, 44, who has been in Sinclair Oil Co.'s tax department for the past 25 years, died May 18 in Fort Worth, Tex.

Thomas K. Cherry, assistant credit manager of Continental Supply Co., died in Dallas May 18. He had been with the firm for the past 25 years.

PROOF OF PORTABILITY.—A complete 12-trace P-11 seismograph can be carried by five men. Left to right: Development unit (50 lb.); power supply and 12-volt, 34-amp.-hour battery (50 lb.); amplifier unit with 12 amplifiers and control circuits (40 lb.); blaster (above) and oscillograph (25 lb.); 25 geophones and two 1,000-ft. multiconductor cables with reels (50 lb.).

Miniature Seismograph Features *Performance Plus Portability*

by Harry J. Girard*

GEOPHONE.—The S-15 flat-base geophone measures 1⅝ in. in height and diameter. With 1¾-in. spike, the geophone weighs 13 oz. Its sensitivity compares favorably with standard-size detectors. When used with P-11 seismograph, a single detector per trace is standard practice.

THE desirability of obtaining seismic surveys in the "inaccessible" potential oil provinces of the United States and foreign countries is generally recognized. Seismic surveys in these so-called inaccessible regions have been made with standard or partially portable equipment, but only at a cost that has been extremely high. Costs go up in proportion to the inaccessibility of prospective regions until they are finally prohibitive.

A portable seismograph was unquestionably the answer to the problem of how to get seismic surveys in tough country at a reasonable cost. Such a seismograph, however, must give records of the highest possible quality and repeat shooting must be reduced to an absolute minimum for only if these qualifications are met can a portable seismograph do much toward keeping down the costs in the roadless areas.

Assignment.—The assignment given to the research engineers of Southwestern Industrial Electronics Co., Houston, was the development of a truly portable seismograph with performance characteristics equal to those of full-sized instruments, with the stipulation that under no condition was performance to be sacrificed for the sake of portability.

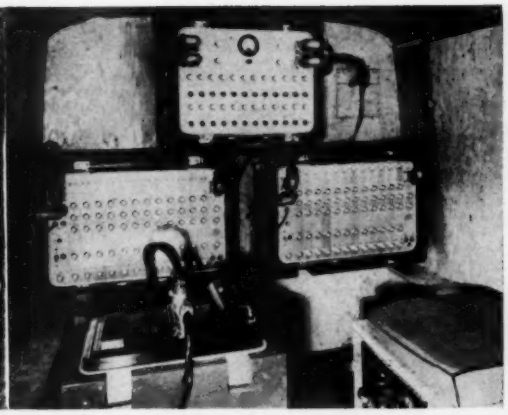
During the 3 years between getting the assignment and a day last May when the first field tests were made, the research and development men of S.I.E. tried and discarded many designs. Every new development in the art of electronic engineering was carefully considered in the light of its possibilities of aiding the solution to their difficult problem.

The results of the first field testing about 1 year ago of the then-called PX-11 were so satisfactory that by late June the first P-11 seismograph was ready for sale to the industry.

This seismograph was composed of a developing unit weighing 50 lb., a power supply weighing 50 lb., 12-trace

*Vice president, Southwestern Industrial Electronics Co., Houston.

Frontier Exploration Co. crew lays cable from portable reels.



Recording instruments in Weiss Geophysical Co. panel truck.

amplifier unit weighing 40 lb., blaster weighing 8 lb. and oscillograph weighing 25 lb., 25 geophones, and two 1,000-ft. multiconductor geophone cables with reels weighing a total of 50 lb. This entire equipment is packed in convenient carrying cases and can be carried by five men.

First party.—The first production model of the P-11 was delivered to McCollum Exploration Co. at Calgary, Alta., Canada, in July 1950. McCollum's crew, under W. L. Anderson, conducted operations in the Peace River area of Alberta until late November. During this initial survey the lightweight instruments were transported manually from camp locations. In early December, E. O. Haley, of McCollum's Houston laboratory, took over the crew for operations in Saskatchewan. In late December, Paul Brannon was put in charge of this crew which is still operating in the same area with the original instruments.

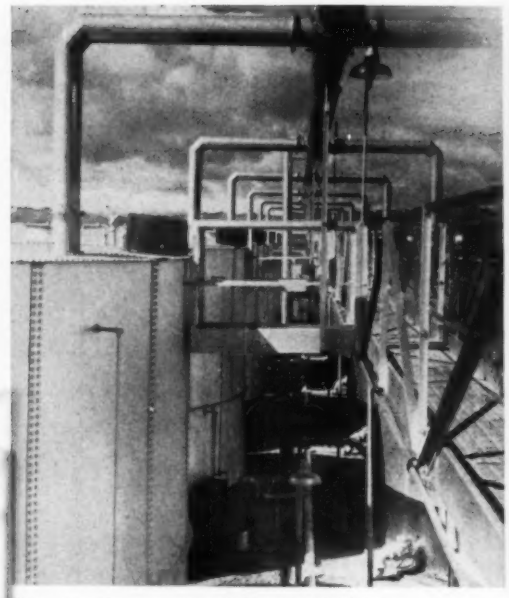
Late in July of last year, Geophysical Associates of Canada received its first P-11 seismograph at Calgary. Under Walter H. Murphy, a crew worked the muskeg in the Lesser Slave Lake area for 3 months. The instruments were transported on small tracked trailers pulled by a lightweight Fordson tractor. At first a standard truck-mounted drill was used but as the terrain became more difficult and the crew was forced to make log roads for this heavy equipment progress was slowed down to as little as ¼ mile per day. Operations were speeded up satisfactorily after portable drills were substituted for the standard drill. After 3 months of this type of operation, the crew moved into the Peace River area, with W. H. Reese supervising and Joe Sides as party chief. Geophysical Associates are still conducting winter operations in this area.

Last August, Farney Exploration Co. put its first P-11 seismograph to work in the bush country about 100

(Continued on page 128)

Sled mounted recording body used by Northwest Seismic Surveys, Ltd. Contains two bunks, two benches, heaters, complete instruments and developing facilities. Dynamite rack in front.

Left: Geophysical Associates of Canada crew laying log roadbed for standard drill and water trucks. One quarter mile per day. Note lightweight tractor NDT using log road. Right: Lightweight tractor and tracked trailers transport complete recording and shooting equipment for Geophysical Associates of Canada crew. Using portable drill, good progress was made over worst possible terrain.



Recovery system on a large battery operated by Sunray Oil Corp. in Guijarral Hills field. A 12-in. balance-line is used with 8-in. laterals. To provide condensate drainage the bottom of the laterals is constructed so that it is ½ in. lower than the header.

At this South Cuyama compressor installation the unloading valve on the compressor cylinder automatically functions when vacuum becomes too high in the intake line. The compressor has a 10 by 9-in. cylinder, and is V-belt driven by the 15-hp. motor.

Design and Operating Considerations Of Tank-Vapor-Recovery Systems

by D. H. Stormont
West Coast District Editor

NO. 2 OF A THREE-PART SERIES

THE normal tendency of some crude-oil producers is to give only little consideration to the practice of recovering vapors from lease flow tanks. Vapor-conservation equipment may be employed to reduce evaporation losses and thereby conserve oil gravity. All too often, though, operators may not be sufficiently "gas conscious" to employ vapor recovery as a means of increasing income from oil operations.

Recovering these vapors is by its very nature a salvaging operation—the collecting of relatively small quantities of solution gas freed from the crude while it is temporarily stored in lease tanks. In some instances sufficient vapors may be flashed to effect a very quick payout. In others, because of the urgent need for reducing fire and explosion hazards, cost considerations may be of secondary importance. Between these two extremes is the situation most generally encountered: one fairly close to being a marginal operation.

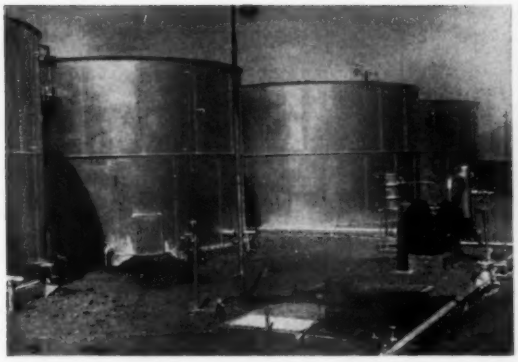
The amount of gas which can be recovered in these systems per barrel of produced crude varies widely, depending upon several factors. Most important are gravity and temperature of the crude, and the drop in pressure which takes place following low-stage separation.

Where a pressure drop of about 20 psi. or higher occurs between the low-stage separator and the flow tanks, the volume of vapors recovered in California fields ranges from less than 20 to more than 60 cu. ft. per barrel of produced crude oil. Where the pressure drop is appreciable there will be a high content of entrained liquids in the vapors, making them even more valuable.

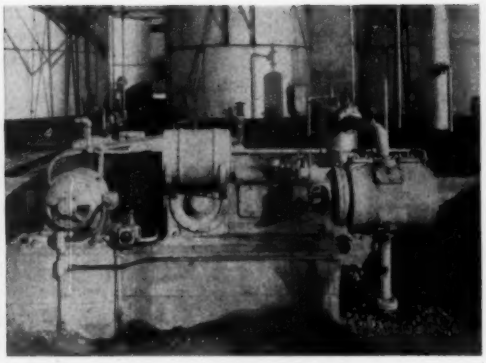
If elevated separators are used and operated at near-atmospheric pressures, the great bulk of recoverable vapors will be removed from the crude before it enters the tanks. Even so, because of agitation, and especially if heat is used to effect an oil-water separation, it may be worth while to recover the vapors.

Studies have shown that lease-tank evaporation can be reduced to the extent of 50 per cent or so, solely through the use of gastight tanks equipped with vapor-conservation devices. Through going one step further and installing collecting equipment, however, all vapors actually are recovered and run to a natural-gasoline plant for processing.

The volume of vapors collected is often relatively small, possibly only about 25 M.c.f. daily from a battery. Or it may exceed 200 M.c.f. daily. In any event by carefully analyzing all pertinent factors and determining the volume of recoverable vapors and their liquid content, their potential value can be closely estimated. After estimating the initial investment re-



Richfield Oil Corp. South Cuyama tank battery equipped for recovery of tank vapors. The 25-hp. motor-driven compressor in the foreground compresses the vapors from a vacuum of 5 in. to a discharge of 30 psi. The compressor is a horizontal, single-cylinder unit having a 12-in. bore and 9-in. stroke.



Motor-driven compressor at a Shell Oil Co. battery in Seal Beach field. The compressor, a single-stage unit with a 7 by 7-in. cylinder, has a rated discharge capacity of 122 M.c.f. at 100 psi. It is driven by a 15-hp. motor. Cooling of jacket water is provided by a radiator.

quired to effect their recovery, length of payout then can be approximated.

The actual cost of installing vapor-recovery equipment varies widely, as was pointed out in the earlier article. In some instances only $2,000 or less may be required to equip a four-tank battery, or in another case $10,000 may be required for the installation.

At some batteries the principal equipment required may consist of adding self-closing, sparkproof gage and thief hatches; a vapor balance line; pressure and vacuum relief vents, either in conjunction with the balance line or as an integral part of the hatches; and a regulator on the vacuum line. If it is desired to eliminate all air from the tanks, to reduce fire and explosion hazards and interior corrosion, a second regulator is necessary to permit automatic repressuring of the tanks with field gas whenever a vacuum develops.

Where no vacuum gathering lines exist or are so far distant that it is not economical to run a line to them, compression equipment is required at each battery. These supply the vacuum necessary to pull the vapors from the collecting system and boost them to sufficient pressure to enter the field low-pressure gathering system.

Design of Systems

In the design and installation of vapor-recovery systems it is important to keep in mind that the pressure drops involved are small. Vacuum and pressure relief valves ordinarily are set to function somewhere between 0.5 and 2.0 oz. (about 1 to 4 in. water). The drop in pressure from the ends of the system through the pressure (and vacuum) regulator must therefore be kept well within these limits.

For this reason it is necessary that the header, laterals, and all other piping be properly sized and streamlined. If maximum benefit of the recovery system is to be gained, the piping must be of sufficient diameter to permit the vapors to be readily withdrawn. It logically follows that angles, bends, and other resistances to flow be kept at a minimum as only a slight pressure drop can be allowed in the piping system.

Five important factors to be considered in designing a vapor recovery installation are: (1) volume of gas, (2) specific gravity of gas, (3) diameter of piping, (4) pressure drop required, and (5) allowable pressure drop. The first two are determined from a survey of the battery and the last is set by the pressure desired to be carried on the tanks. Knowing these, the size of balance line and laterals which result in a pressure drop within the limits available is then chosen.

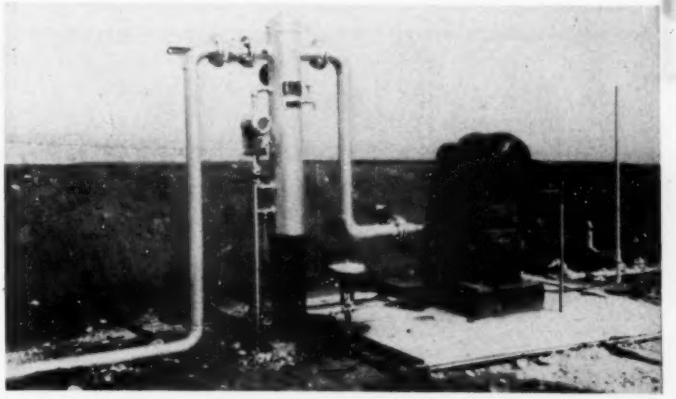
In arriving at the volume and content of the vapors the general practice is to use recording orifice meters to determine flow rates and the standard charcoal test to establish their average gasoline content. It is believed advisable to make these surveys over a period of several days in order to offset variations in volume and composition caused by temperature changes. Needless to say, close cooperation of the producing department is required during these surveys.

Having arrived at the line sizes and pressure drop required, allowances must be made for possible further expansion. Also so that any sudden overloads can be handled, its is believed wise to slightly oversize the piping.

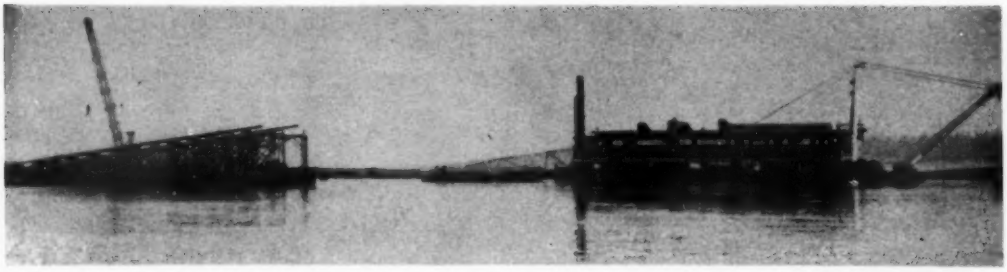
So that the full size of piping will be available for the flow of vapors, drainage of the balance and lateral lines should be considered. Some operators prefer to have the laterals slope slightly upward to the balance line so that any liquids condensing will drain back into the tank.

One California contractor, Superior

(Continued on page 129)



Small air-cooled compressor belt driven by electric motor. The knockout chamber in the intake line is equipped with a high-level mercury switch which automatically shuts down the compressor when height of liquid reaches a given level.



The dredge "Duplex" cutting through a sandbar in the Mississippi River, is shown here followed closely by double-ramp barge.

Double-Ramp Method Used in Laying Pipe-Line River Crossing

by N. A. Saigh, Jr.*

AN underwater pipe-line crossing of the Mississippi River completed recently for Texas Gas Transmission Corp. by N. A. Saigh Co., Inc., has some features which may be noteworthy examples of a new line of thinking in river-crossing design.

This particular project consisted of a dual 12-in. crossing near Helena, Ark., built by Texas Gas to furnish natural gas from its main transmission lines on the Mississippi side of the river to the Mid-South Gas Co. for distribution to several cities and industries in the eastern Arkansas area.

The primary feature of design which sets this project apart from its predecessors was the extensive deep-dredging operation carried on in connection with its construction. Where nearly all recent large crossings have been laid directly on the river bottom or with light cover, these pipe lines were dredged into the bottom to a minimum of 30 ft. below the bed. Very large approach cuts were made in each bank to insure that no scour or cave-ins could shear off the lines and cause a failure. No slack loops, such as have become customary in river-crossing practice, were utilized; both lines were laid straight across the river.

From the construction standpoint an unusual feature of the job was the double-ramp barge used to lay the lines simultaneously.

Both lines used a common ditch and their spacing therein was approximately the same as that on the double-ramp barge, about 30 ft. A fathometer leased from the Corps of Engineers was utilized to considerable advantage in making sure that the pipe was being lowered into the ditch exactly in the center. This device gave positive evidence at all times of the progress of the underwater work and was of invaluable aid in prosecution of the undertaking.

Each approach cut was prepared before pipe-laying operations commenced. These cuts were approximately 1,000 ft. long by 500 ft. in lateral dimension and they were a maximum of 80 ft. below original bank grade. On completion of the approach cuts the hydraulic dredge started across the river from west to east, excavating the channel ditch to a depth of about 35 ft. below bottom grade.

The ramp barge and its attendant plant followed as closely as possible behind the dredge, welding on and feeding in 120-ft. sections of pipe. The interval was kept small to minimize loss of ditch due to cave-ins prior to the lowering-in of the pipe. This phase of project consumed about 22 days. Width of river proper at this point was about 1 mile. All pipe was triple-jointed, coated, wrapped, and weighted on shore to reduce the work which had to be performed on the barges. The approach cuts were backfilled by the dredge; normal silting action of the river was counted on to fill the river channel.

Approximately 3,000,000 cu. yd. of earth were handled during the job, representing many times the yardage moved on similar previous crossings. There is no doubt, that the extra expenditure involved will be more than justified through relatively increased permanence and assurance of lowered maintenance cost.

Approach for the dual 12-in. crossing cut in the east or Mississippi side of the river.

*Vice president, N. A. Saigh Co., Inc., San Antonio.

Another development using

B. F. Goodrich Chemical Company ***raw materials***

Piston with a **HYCAR "heart"** conquers abrasive mud!

Slush Pump Piston made by Keystone Tool Corp., Houston, Texas.
Hycar parts made by Murray Rubber Co., Houston, Texas.

ONE of the most vulnerable points to abrasive drilling mud in the entire mud manifold is the slush pump piston. Failure here can cost *plenty*. But with Hycar rubber doing its part of the job, you have protection that just can't be beat! You can see Hycar used with a piston of improved mechanical design in the picture here.

Hycar is chosen so often for oil field equipment and machinery because it is extremely resistant to oil and gas—to abrasion and hard, steady wear. Its compounds resist heat and cold, and the deteriorating effects of a great variety of fluids. Hycar has more advantages that may be exactly what you need to develop, or improve products.

At present, demand for Hycar rubber exceeds supplies. However, we can supply experimental quantities for development work. And we'll gladly help with technical advice where government specifications are involved. We supply raw materials only—no finished products. For information, write Department HF-6, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Need high tensile strength? Hycar has it—plus abrasion resistance and more advantages.

Hycar
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors

Review of Quantitative Methods of

ELECTRICAL-LOG INTERPRETATION

by Sylvain J. Pirson*

IN the past few years the development of quantitative methods of electrical-log interpretation has permitted derivation from the log of a great deal more useful information than was possible in the past when the logs were looked upon merely as a "picture," and their more or less perfect "hour glass" shape was a measure of their quality. This is still a desirable feature for geological correlation and stratigraphic studies.

From a quantitative-interpretation standpoint logs are actually a "simultaneous system of equations," one equation corresponding to each curve. A standard log is composed most generally of at least three curves which permit the calculation of three unknowns:

1. The spontaneous potential curve indirectly permits an evaluation of the formation water salinity in parts per million. More directly, it is the resistivity of this water which is evaluated.

2. The short investigation-resistivity curve (that with short spacing) responds mainly to the characteristics of the mud filtrate invaded zone in a porous formation and permits an evaluation of formation porosity in per cent.

3. The long investigation-resistivity curve (that with long spacing) responds mostly to the undisturbed and noninvaded part of porous formations and permits the evaluation of the true resistivity of the formation in place. Further calculations permit the evaluation of connate-water saturation and to forecast the oil (and/or gas as the case may be) productivity of a specific formation of interest.

*Stanolind Oil & Gas Co., Tulsa. Paper presented at A.P.I. Mid-Continent district 1951 spring meeting, Amarillo, Tex.

Quantitative electrical-log interpretation entails, as its ultimate objective, the determination of reservoir porosity (and effective pay), formation-water saturation, permeability, and expected fluid-production ratio (ability to produce oil and/or gas and at what water-oil or water-gas ratio).

The interpretation of electrical logs is an intricate subject which presupposes considerable technical knowledge of the fundamental principles involved in the measurements, so that logs which may appear as "problems" may be solved by the application of fundamental thought. It may be said that each curve on the log is an "equation." It is well known that one cannot solve for more unknown quantities than there are simultaneous equations in an algebraic problem. The unknowns in the electrical-log interpretation are:

S.P. lithological factor (K)
Connate-water resistivity (P_{w_c})
Reservoir porosity (ϕ)
Cementation exponent (m)
Formation-resistivity factor ($F = \phi^{-m}$)
Connate-water saturation (σ_{w_c})
Saturation exponent (n)

Generally, the electrical log offers three fundamental curves (S.P., short normal, lateral) for the solution of the independent unknowns. It is quite evident that either reasonable assumptions must be made concerning some of the unknowns or they must be measured independently. The quantities whose values are generally assumed are connate-water resistivity (or its equivalent—the S.P. lithological factor) and the cementation and saturation exponents. All three assumed quantities are lithological factors which depend upon the rock mineral "makeup." Fortunately, they remain fairly constant and are characteristic of geological formations susceptible to be reservoir rocks. Accordingly, the indetermination inherent to the solution of an electrical log may be lifted by ascertaining these constants for various geological horizons of interest.

Connate-water resistivity may be measured on representative samples of formation water. Cementation exponents may be measured in the laboratory by testing rock samples (permeability plugs or full-size cores) for formation-resistivity factors. Saturation exponents may be measured in the laboratory during capillary-pressure desaturation tests.

We have good reasons to believe that cementation and saturation exponents are constant within a geological horizon, provided no important facies and mineralogical changes take place. Conversely, connate-water resistivity may be highly variable within a geological formation. Various laboratories have embarked upon a program of accumulation and measurement of the above basic rock data which clearly are of the utmost importance in the exact evaluation of the electrical logs.

However, we cannot expect to ever gather complete information on all geological formations in the immediate future, and it will be necessary to resort to assumptions for many years to come when evaluating electrical logs of certain formations and

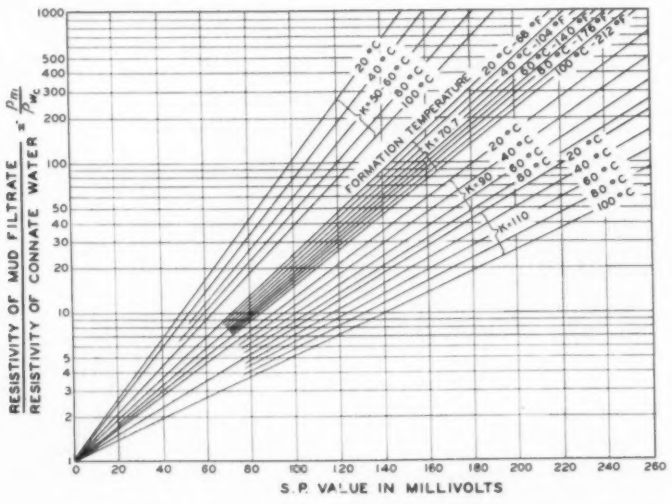
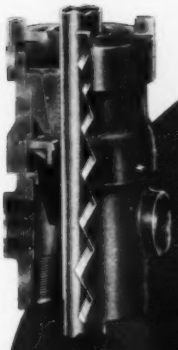
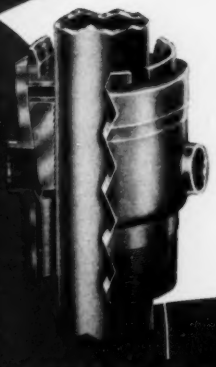


Fig. 1—Relationship between self-potential and resistivity ratio.



Put these heads together



FOR GREATER SAFETY, UTILITY AND ECONOMY

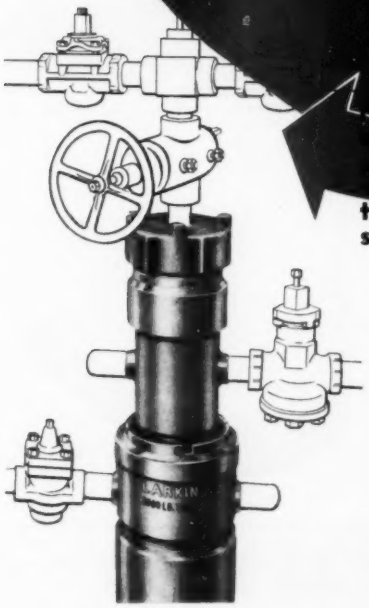
LARKIN TUBING HEAD

1.
2.
3. Co... Pa...
4. For...
5. Lark... out ... while ...

LARKIN CASING HEAD

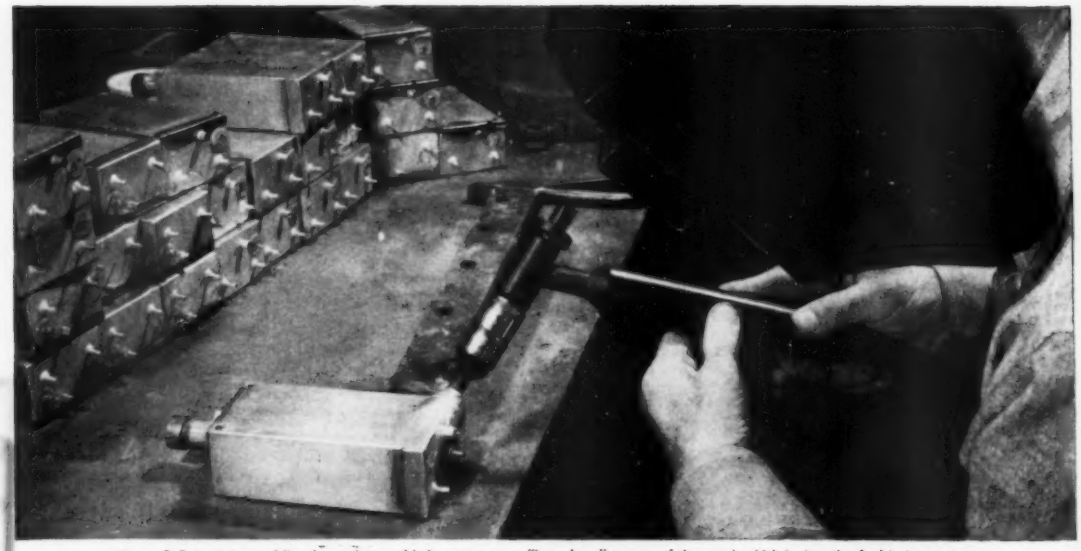
1.
2.
3.
4. ...st
5. ...ge of ...ers and ...trol Equip-

...trol for medium-pressure wells.



Specify **LARKIN** ... Through Your Supply Store

LARKIN PACKER CO., INC
St. Louis, Mo.



Here, G-E Inert-Arc welding is used to weld the seam on a "buzz box," source of the spark which ignites the fuel in jet engines.

WHY G-E INERT-ARC WELDERS CAN SPEED UP YOUR DEFENSE PRODUCTION

You can speed up the fabrication of ship and plane parts made of aluminum, magnesium, or copper alloys by using General Electric a-c Inert-Arc welders because they are specially designed for welding these materials. They give your operators many features not found in "jury-rig" modifications of ordinary a-c metal-arc welders.

Exclusive "Balanced Wave" Design

Balanced-wave design, for example, an exclusive feature of G-E Inert-Arc welders, enables your operators to increase travel speeds, make stronger welds, and reduce power and gas consumption.

"Idlematic" Control for Safe, Simple Operation

The high-frequency pilot, the flow of gas, welding current, and cooling water are controlled by the use of G-E "Idlematic" control. This permits the operator to save time and reduce spoilage by making it easy to start the arc at the proper spot on the work because he can position the electrode with his hood up.

Crater-filler or Remote Control

On applications requiring weld craters to be level at the end of each weld bead, use of the optional G-E crater-filler will enable you to do the job quickly. Where desired, a hand or foot switch can be furnished to allow continuous stepless current control while welding.

Write for Free Bulletin

For detailed information on how you can speed up fabrication of aluminum and other alloys, write for bulletins GEC-596 and GEC-653. *General Electric Company, Schenectady, N. Y.*

G-E Inert-Arc welders are easy to use. Simply touch the electrode to the work and you're off to a quick clean start—and without using flux. The welders are available in 200-, 400-, and 800-ampere ratings.

G-E "BALANCED WAVE" GIVES STRONGER WELDS, FASTER TRAVEL SPEEDS—with reduced power and gas costs

Key to the advantages of the G-E "balanced-wave" Inert-Arc welder is the use of series capacitors in the output circuit. These capacitors block the d-c current which would otherwise be produced by the arc, and make it possible to get an even, uniform flow of a-c current.

This design, with the high-frequency pilot used only for starting, eliminates objectionable radio interference caused by welders using continuous high frequency.

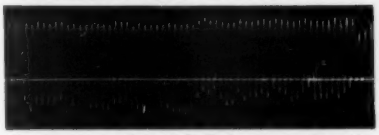
You Get Stronger Welds, Faster Travel Speeds

Under identical conditions G-E "balanced-wave" welders give you a greater depth of penetration, better bead contours, and greater fusion area than welders with unbalanced-wave circuits.

This means, therefore, that an operator can do the job faster by using the G-E equipment.

G-E Inert-Arc Welders Give Even Flow of Current

Conventional Shielded-arc Welders Give Uneven Flow



Steady current from G-E "balanced-wave" welder gives better welding at lower cost than unbalanced-wave currents from shielded-arc equipment.

"Balanced Wave" of G-E Inert-Arc Welders Produces Deep Penetration, Wide Fusion Area

Unbalanced Wave of Ordinary a-c Metal-arc Welders Produces Shallow Penetration, Narrow Fusion Area

Above macrosections are from two pieces of ¼-inch aluminum, on which beads were run without the addition of filler metal, and under identical welding conditions.

G-E Inert-Arc Welders Can Reduce Your Power and Gas Costs

Because your operators can weld faster with G-E Inert-Arc welders, less gas and power are consumed. Saving in power costs and gas consumption have been estimated as high as 25% using G-E Inert-Arc welders, because of Idlematic control, series capacitors and momentary high-frequency pilot.

Holders and Tungsten Electrodes Are Designed for High-speed Work

An operator can adjust by hand a tungsten electrode in the illustrated holder. No wrenches are required.

And he can do a wide variety of jobs with the same holder. Using it with a 200-ampere G-E Inert-Arc welder, for example, an operator can weld both light- and medium-gage materials, with electrodes up to eight inches in length in diameters of .040, $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, and $\frac{5}{32}$ inches.

To give you the right electrode for any job, G.E.'s 99.9% pure tungsten is available in a wide variety of diameters and lengths in both standard and thoriated types.

ASK ABOUT G.E.'s THORIATED TUNGSTEN

For d-c Inert-Arc welding only—you get 10 times normal electrode life with thoriated tungsten electrodes. Its strength compares with standard pure tungsten. Write today for more information. *General Electric, Schenectady, N.Y.*

Holders for G-E Inert-Arc welders are available for any current requirement from 15 amperes to over 800 amperes, a-c or d-c.

GENERAL ELECTRIC

711-13

Mud: natural resistivity at 95° F. = 1.2 ohm × meter.
Bottom hole temperature: 195° F. (est.).
Hole size: 8⅝ in.
Formation-water salinity: 28,000 p.p.m.
S.P. lithogical factor: 70.
Tested water at 10,480 ft.

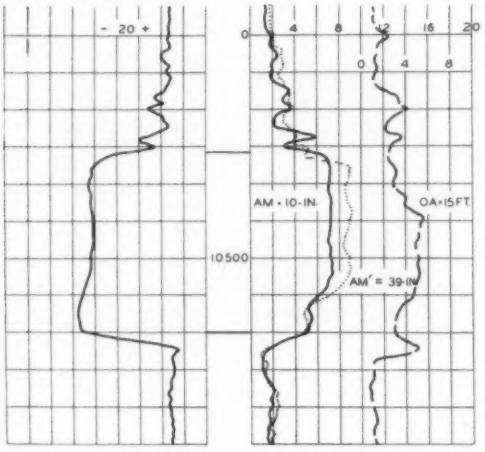


Fig. 2—Example of Gulf Coast log.

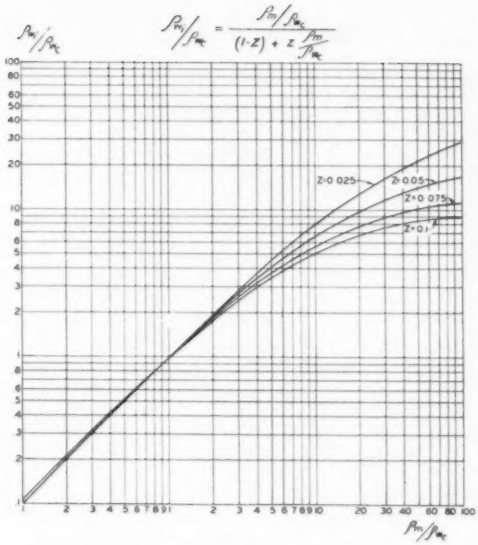


Fig. 3—Water resistivity in the invaded zone as a function of connate water and mud resistivities. (After Tixier.)

in certain areas. When the basic data are not available, it is necessary for the interpreter to crosscheck his answers by all methods at his command and to establish probable limits within which the true answer may be comprised. This taxes the ingenuity of the interpreter to the utmost and necessitates a constant alertness which may develop only with constant practice, experience, and study. This becomes truly a "specialist's" job. Obviously, but few men may become such specialists; however, their need is clearly indicated by the numerous possibilities of passedup production which are discovered by a reexamination of old logs.

The techniques used in examining electrical logs for productivity will be briefly reviewed.

Quantitative Relationships

Without going into the details of their derivation, of their limitations, nor of their empirical justification, the basic equations of quantitative interpretation are the following:

1. The S.P. equation.

2. The short investigation-resistivity-curve equation.

3. The long investigation - resistivity-curve equation.

S.P. equation:

$$S.P._{ms} = -K \log p_m/p_{we} \quad (1)$$

in which the S.P. deflection, as measured from the shale base line, is expressed in millivolts. K is the S.P. lithological factor which presumably characterizes a formation of constant lithology. Its value varies from 50 to 110; the low value on the scale applying to shaly sands, whereas the upper part of the scale applies to carbonate rocks. A good average value for K is 70, for which value there is considerable theoretical justification. p_m and p_{we} are, respectively, the mud resistivity and the formation-water resistivity at the level and temperature of the formation of interest.

The resistivity unit is the ohm x meter. If three quantities are known in Equation 1 a fourth one may be determined. Generally, the unknown quantity is p_{we} since the S.P. in mv may be read from the log, p_m appears on the log heading and a temperature correction to formation depth may readily be made. The K value is selected from a lithological description or from experience. Solution of Equation 1 is most readily made by means of a chart such as Fig. 1.

Applying Equation 1 to the example log of Fig. 2 where an S.P. deflection from shale line reads 80 mv average, and assuming a K value of 70.7, p_m/p_{we} is found to be equal to nine for the prevailing bottom-hole temperature. The mud resistivity p_m corrected to formation temperature reads 0.6 ohm x meter. Hence $p_{we} = 0.6/9 = 0.0668$, which corresponds to a connate-water salinity of 36,000 p.p.m. chloride. The reported formation-water salinity from sample analysis is 28,000 p.p.m. This is, however, considered a satisfactory check.

Equation of the short-investigation resistivity curve:

$$p_i = \frac{p_{wi} F}{\sigma_{wi}^n} \quad (2)$$

where

p_i = resistivity of the mud-filtrate invaded zone.

p_{wi} = resistivity of the water in the invaded zone.

F = formation resistivity factor of $F = \phi^{-m}$, where

ϕ = fractional porosity and m is the cementation exponent.

σ_{wi} = water saturation in the invaded zone.

Equation 2 is essentially Archie's empirical rule applied to the mud-filtrate invaded zone. It is well known that mud filtrate does not completely flushout oil or gas contained in a reservoir rock. Generally the residual nonconductive fluid, either oil or gas, may be assumed to be of the order of 30 per cent, making $\sigma_{wi} = 0.70$ and $\sigma_{wi}^2 = 0.5$. The Exponent 2 is the most commonly assumed value for the saturation exponent (n).

p_{wi}, the resistivity of the water in the invaded zone is a combination of the resistivity of connate water and mud filtrate. If the porosity fraction occupied by unflushed connate water is Z, p_{wi} may be calculated from Fig. 3 (after Tixier). A safe assumption is to take Z = 0.075.

F, the formation resistivity factor, is the unknown in Equation 2. It involves porosity (ϕ) and cementation factor (m). The latter may generally be inferred from lithological description and varies from 1.3 for unconsolidated sands to 2.0 and 2.2 for hard rocks.

p_i, the resistivity of the mud-infil-

Now CMH *offers*

a proved expansion joint for pressures up to 5500 psi

Advancements in the design of the CMH FLEXONIFLEX Expansion Joint—the "proved-in-service" high pressure expansion joint—now make it possible to offer units for working pressures up to 5500 psi. For all power and process applications it means that the advantages of compact, easy-to-install expansion control may be used at pressures far beyond those which had previously been considered safe.

Standard FLEXONIFLEX units have bellows type stainless steel pressure carriers, single or multiple ply, lined or unlined with integral control rings and end sections. Sizes range from 5/8" through 6" I.D., although larger sizes can be furnished. Suitable for temperatures from sub-zero to 1600° F. (higher with special materials).

For specific recommendations send complete details of your application.

OTHER CMH EXPANSION JOINTS

For low and medium pressure service you may take advantage of the same engineering skill that has developed FLEXONIFLEX units. CMH Controlled-Flexing Expansion Joints are available in copper or stainless steel for pressures up to 300 psi, sizes to 48" I.D. CMH Free-Flexing Expansion Joints are also available in copper or stainless steel for pressures up to 30 psi. sizes to 48" I.D. Larger sizes are available in both types for special applications.

Flexon identifies CMH products that have served industry for over 49 years.

CHICAGO METAL HOSE Corporation

1345 S. Third Ave. • Maywood, Ill. • Plants at Maywood, Elgin, Rock Falls, and Savanna, Ill.
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ont.

CMH

ONE DEPENDABLE SOURCE
for every flexible metal hose requirement

Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals • Expansion Joints for Piping Systems
Stainless Steel and Brass Bellows • Flexible Metal Conduit and Armor • Assemblies of These Components

See Our Catalog in Sweet's File

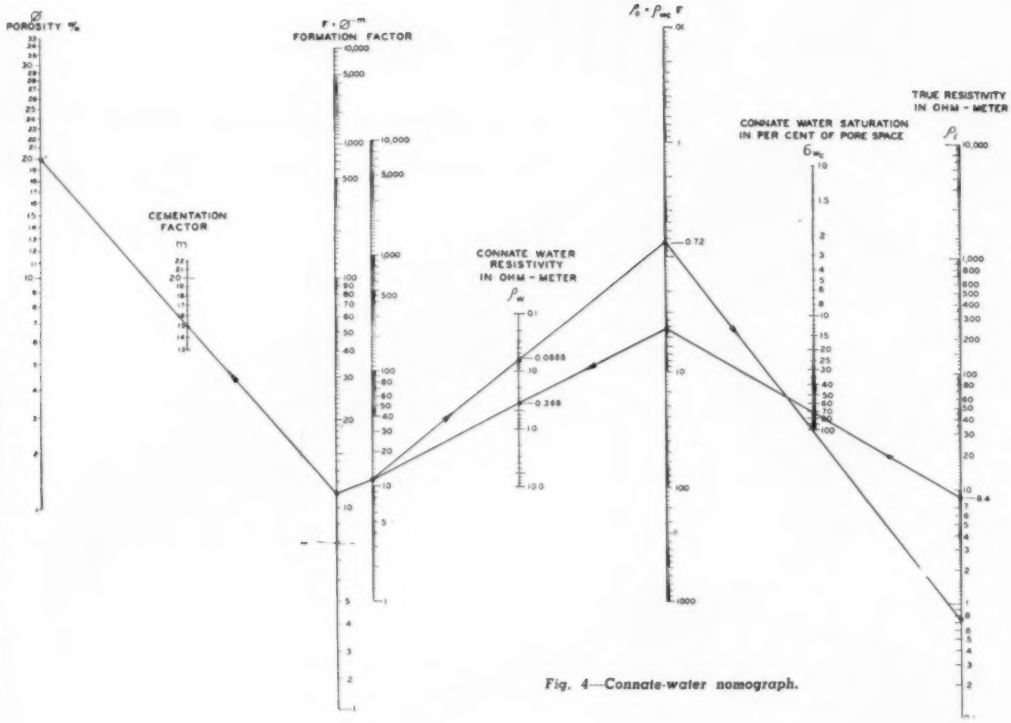


Fig. 4—Connate-water nomograph.

trated zone is obtained from a shallow investigation-resistivity curve, such as the short normal curve with AM spacing varying from 8 to 18 in. (Schlumberger designation) or the 4iZ 18-in. curve (Halliburton designation). p_t in Equation 2 must be the resistivity in place (true value) and in order to obtain it, a correction is needed for mud resistivity, hole size, and electrode spacing which in the case of normal curves is readily done by departure curves for thick beds (provided the beds are thicker than 50 times the well diameter).

Applying Equation 2 to the example log of Fig. 2, the AM = 10-in. curve reads an average resistivity of 7 ohm x meters. Corrected for hole size and mud, the true reading is p_t = 8.4 ohm x meters. In order to find the formation factor, the nomograph of Fig. 4 will be found useful and rapid. This nomograph permits a solution of Archie's equation for all possible conditions. Assuming σ_{wi} = 70 per cent and Z = 0.075, we find:

$$p_{wi}/p_{wc} = 5.5 \text{ corresponding to } p_m/p_{wc} = 9.0 \text{ (on Fig. 3)}$$

or

$$p_{wi} = 5.5 \times 0.0668 = 0.368 \text{ ohm x meter}$$

Starting with 8.4 on the scale to the right of Fig. 4, it is joined by a straight edge to the 70 per cent point on the connate-water saturation scale, the intersection on the p_o scale is joined to p_w = 0.368 and the intersection with the formation factor scale reads F = 11.0. For a Gulf Coast sand, a cementation exponent of m = 1.5 is reasonable and joining F and m by a straight line, a porosity of 20 per cent is found. This is again a reasonable answer for the object sand.

Equation of the long-investigation-resistivity curve:

$$\sigma_{wc}^2 = p_o/p_t \qquad (3)$$

Essentially Equation 3 is another form of Equation 2 or Archie's law. Formula 3 is written for the specific purpose where p_o, the resistivity at 100 per cent connate-water saturation may be read directly from the log as is the case when well-defined water horizons are logged. Often this is not the case and p_o must be calculated from:

$$p_o = p_{wc} \cdot F = p_{wc} \cdot \phi^{-m}$$

Since the formation factor F was obtained from the short-investigation curve (or equation) and the p_{wc} from the S.P. curve (or equation), p_o is readily determined from Fig. 4.

However, when p_o may be read directly from the log, a great deal more certainty is attached to the evaluations. p_t is the true resistivity of the uninvaded formations. To obtain it, measurements which essentially overshoot the invaded zone must be made. This is obtained from the lateral curve of spacing AO varying from 13 to 24 ft. (Schlumberger designation) or the 3iZ 6 to 18-in. curve (Halliburton designation). These curves are unfortunately greatly distorted by mud in the well bore and the invaded zone and more particularly by the geometry of the spaced electrodes on the logging tool with respect to bed thickness. The subject distortion is too involved to be covered in this brief review.

In case of the example log of Fig. 2, the lateral spacing is 15 ft. and the average reading is 5 ohm x meters. A study of the two normal curves and of the lateral curve by means of "departure curves" for thick bed and with invasion indicates that the lateral is far from reading the resistivity of the uninvaded formation. This study is summarized in Fig. 5 which indicates the following solution to be highly probable:

Invasion diameter = 10 × d = 7 ft. 4 in.

True resistivity = p_t = 1.2 × 0.6 = 0.72 ohm x meter.

Solving for connate-water saturation according to Equation 3 by means of nomograph of Fig. 4, we find by

Dollars in the air don't make sense!

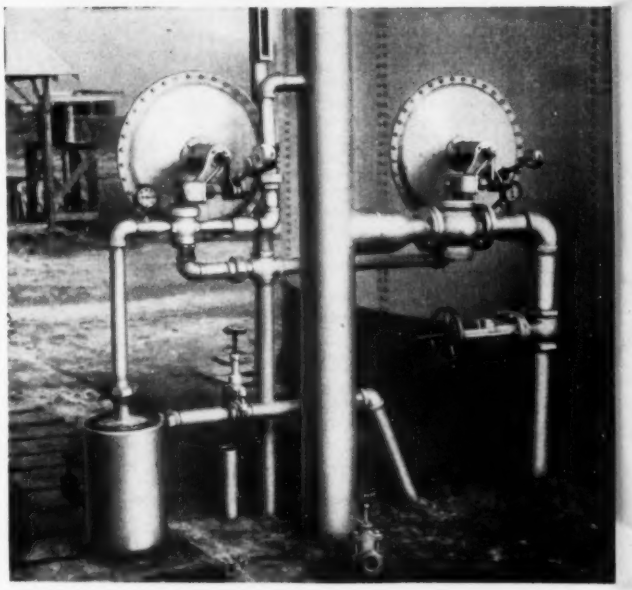
Vapors normally escaping through breathing and filling losses are literally dollar laden. These are the vapors that may even contain more rich light ends than given off at the well head. These are the vapors that when delivered as natural gas now have a greater dollar value than ever before.

"Varec" Vapor Recovery Systems have always been popular in producing areas where there are natural gasoline facilities and pipelines to the markets for natural gas. Now with the advent of more and more gasoline plants and gas pipelines, vapor recovery systems for field tank installations are even more practical.

Each installation requires an engineering analysis for its economics. Under proper conditions, full equipment payoff can be made in a few short months. The Vapor Recovery Systems Company has pioneered in the equipment for such installations. "Varec" field Service Engineers stand ready to assist you . . . call one in today!

The pulse of a vapor recovery system is its two regulators, the "Varec" Wet Gas Regulator (Fig. No. 180, Right) which permits the valuable vapors to pass into the collecting line; the "Varec" Dry Gas Regulator (Fig. No. 181, Left) which permits an even pressure to be maintained in the tank battery for stabilization of the stored product and safety against fire hazard.

P-17



4 Economic Features of Vapor Recovery:

1. **Allows for recovery of valuable light hydrocarbons.**
2. **Natural gas saved has dollar value.**
3. **Stored product has increased value because of increased gravity.**
4. **Installation is safer from fire hazard as tanks are repressured with dry gas only; air is eliminated.**

PROVED and APPROVED "Varec"

THE VAPOR RECOVERY SYSTEMS COMPANY
COMPTON, CALIFORNIA, U.S.A.

Cable Address: VAREC COMPTON USA (All Codes)

New York — Boston — Pittsburgh — Chicago — Detroit — St. Louis — Houston
Tulsa — Casper, Wyo. — Provo, Utah — Los Angeles — San Francisco — Seattle

joining $F = 11.0$ to $p_{w_c} = 0.0668$ by a straight line, that $p_o = 0.72$ ohm x meter and joining this latter point to $p_t = 0.72$ on the last scale to the right, the intersection with the connate-water scale reads 100 per cent water saturation.

Under these fluid-saturation conditions this reservoir is not expected to produce oil or gas irrespective of its fairly favorable "qualitative" appearance on the log. This conclusion was confirmed by drill-stem tests.

While refinements could be introduced in the solution given above for example log, they are deemed to be too complex for this review. One glaring discrepancy in the solution comes from the fact that a formation factor of 11.0 was obtained from Equation 2 whereas it was necessary to use the departure curves $p_t/p_m = 21$ to obtain a fit of the readings on Fig. 5. This may be dismissed on the premises that the formation factor derived from the short-investigation curve is at best an estimate. The discrepancy points furthermore to the necessity of measuring such formation factors in the laboratory on core samples obtained from side-wall cores or conventional cores. A further means of reducing discrepancies in quantitative-log interpretation is through the accumulation of formation-water resistivities of representative samples and to map their variations geologically and geographically in productive and potentially productive provinces.

Rapid Quantitative Evaluation of Logs

In order to perform a rapid evaluation of electric logs and see if a detail quantitative study is warranted by the method outlined herein, the chart of Fig. 6 has been prepared which shows the expected idealized appearance of the logs under various assumed conditions of connate-water resistivity-mud resistivity ratio (p_{w_c}/p_m) versus production potentialities. The resistivity ratio (p_{w_c}/p_m) is reflected in the values of the S.P. curves computed for a K lithological factor of 70 and the corresponding appearance of the S.P. deflection is represented on the left side of Fig. 6.

The idealized appearance of the resistivity curves has been determined for three connate-water saturation status and is represented in vertical columns for each of the S.P. deflections. The water saturations assumed are for the following limiting values:

1. One hundred per cent water saturation.

2. Forty per cent water saturation, which is a reasonable value for the "critical water saturation" of sands and sandstones, i.e., the saturation above which a well is expected to make such a high water-oil ratio as to be uneconomical to operate. This limit is naturally a rule of thumb and must not be taken too seriously. For a better evaluation of the productivity of a sand section it would be necessary to resort to valid relative-permeability curves and to evaluate the fluid viscosities under reservoir conditions.

3. Twenty per cent water saturation which is a reasonable value for the "critical water saturation" of limestone reservoirs. A remark identical to that made for sands is in order.

Further assumptions implied in Fig. 6 are that the short investigation-resistivity curve (the solid line) is relatively unaffected by the uninvaded zone and probes almost altogether into the mud-filtrate invaded section. This renders the chart somewhat dangerous to use, especially in low-resistivity formations when this assumption no longer holds. In addition, it is assumed that the long investigation-resistivity curve effectively overshoots the invaded zone and is relatively unaffected by it, in other words, the spacing of the long-investigation curve must be sufficiently large compared with the radius of the invaded zone. This assumption is often invalidated in low-porosity formations. It goes without saying that Fig. 6 applies only to thick beds.

The log of Fig. 2 is a good illustration of a case where the above assumptions are not fulfilled and it will also illustrate the use of the chart of Fig. 6. The —80 mv S.P. places the log close to —75 mv idealized case and the ratio $p_t/p_t = 7/5 = 1.4$ indicates a water saturation, by interpolation, of about 30 per cent whereas the more detailed study made above condemned this formation as being 100 per cent water saturated. The failure of Fig. 6 to give a satisfactory answer results from the lack of sufficient penetration for the lateral curve of spacing AO = 15 ft. in a highly invaded reservoir.

Fig. 5—Interpolation departure curves. Chart for $p_t/p_m = 21$; D = 10d.

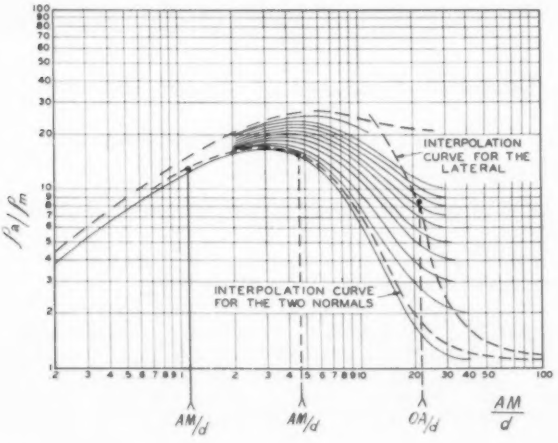
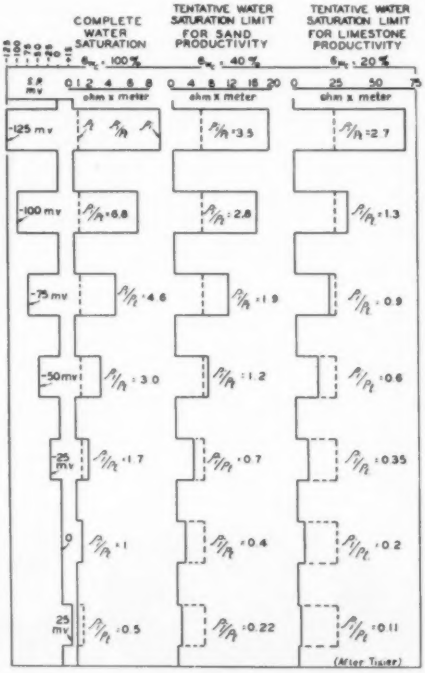
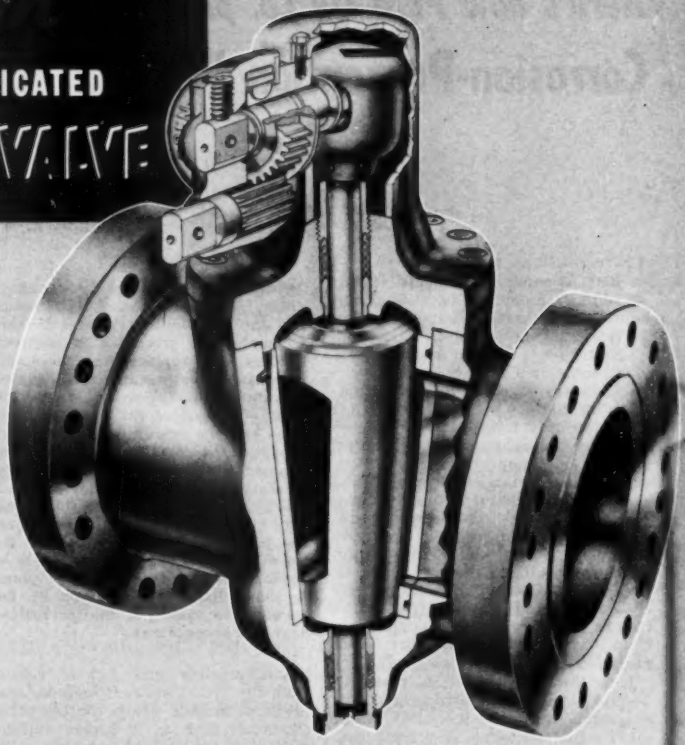


Fig. 6 — Schematic representation of relative position of the various electric-log curves for various S.P. values and water saturations.



NON-LUBRICATED
LIFT-PLUG VALVE



PROVED SUPERIOR IN THESE APPLICATIONS:

- DRILLING AND PRODUCTION
- REFINERIES
- LOADING RACKS
- LPG
- PIGMENT PLANTS
- PETRO-CHEMICAL PLANTS
- GASOLINE PLANTS

NOW, AFTER EXHAUSTIVE FIELD TESTS

BASICALLY BETTER... WAYS

for the Pipeliner

1. NON-LUBRICATED—no grease of any kind required to effect a seal; prevents contamination of line products and clogging of metering equipment; reduces chance for human error and need for maintenance. 2. PRESSURE SEALING — when plug is seated, line pressure automatically forces seat into tighter engagement with plug—body distortions do not affect the seal. 3. UNIQUE LIFT-PLUG ACTUATOR—a novel mechanical design which lifts, turns and reseats plug in continuous turn of a lever. 4. RENEWABLE SEAT AND PLUG—easily replaced; permits any desired trim for specific services. 5. REPAIRS ON THE JOB—can be completely overhauled without removal from line; no special tools or skill required. 6. EASY OPERATION—requires less operating effort than other valve designs. 7. FORGED STEEL—all parts, including body for many sizes, are press or drop forged from specification materials.

THIS NEW VALVE CATALOG

Is yours for the asking.

Send for a copy today.

Cameron

IRON WORKS, INC.

P. O. BOX 1212 HOUSTON, TEXAS

EXPORT: 74 TRINITY PLACE, NEW YORK

BRITISH OIL FIELD EQUIPMENT CO., LTD.

Duke's Court, 32, Duke Street, St. James's, London, S.W.1

Telephone: Whitehall 6177 Cables: BOFEC London

Head Office and Works: Hunslet, Leeds 10

Telephone: Leeds 30035 Cables: BOFEC Leeds

Here's how Pure Oil Co. planned its

Corrosion-Prevention Program for T.C.C. Gas Plant

at its Smiths Bluff refinery

by C. A. Murray* and M. A. Furth*

ABSTRACT

Severe corrosion has been experienced in a Thermofor catalytic cracking unit gas plant over several years. Examples are given which illustrate failures and replacements necessary in tubular heat-exchange equipment. A summary is given of a chemical survey to disclose the type of corrosives and the amount of water which produces the corrosion in the system. Ammonia, hydrogen sulfide, and ammonia salts of organic acids are indicated as the principal corrosives present. Corrosion-prevention measures are described which consist of the removal of water with coalescers at appropriate points in the gas plant. A short discussion is given of the benefits to date of the corrosion-prevention measures.

IN recent times corrosion losses have had a particularly acute impact on refinery economics because of current high operating expenses. Catalytic cracking units in some instances have produced severe corrosion problems which were not experienced with the older thermal cracking units. Serious losses resulting from corrosion have forced a growing consideration for programs which control refinery corrosion.

Attention has been drawn to the economic aspects of refinery corrosion losses by F. A. Rohrman.[1] Programs for reducing refinery corrosion which include chemical neutralization have been outlined recently by E. Q. Camp and Cecil Phillips,[2] and by H. L. Bedell and V. W. Hatchett.[3] Corrosion problems which arise from fluid catalytic cracking have been discussed recently by Nathan Shofer.[4]

It is the purpose of this paper to describe briefly the history of corrosion and corrective measures taken for the gas plant of a Thermofor catalytic cracking unit at the Pure Oil Co. Smiths Bluff refinery, Nederland, Tex.

Feed to the gas plant consists of liquid gasoline and lighter vapors from the T.C.C. units. It includes water from process steam and corrosive chemicals such as hydrogen sulfide, ammonia, and volatile organic acids which result from the breakdown of parent compounds in the charge oil during the cracking reaction.

This gas plant serves two T.C.C. units; it is conventional, with a depropanizer, an absorber, a debutanizer, and a depentanizer as the fractionation towers. The gas plant has a compression system which consists of three stages to 40, 140, and 400 psi., respectively. There are various water separators, heat exchangers, coolers, and reboilers—all of which have been subject to varying degrees of corrosion.

*Pure Oil Co., Smiths Bluff Refinery, Nederland, Texas. Portion of paper presented at A.P.I. Division of Refining meeting, Tulsa, May 1, 1951.

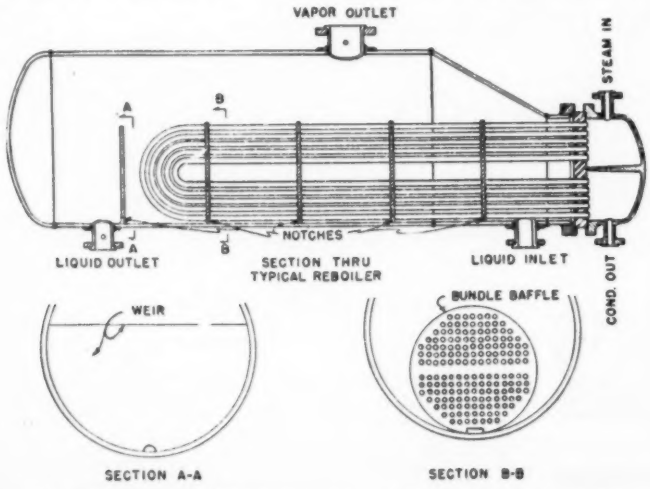


Fig. 1—Arrangement of sludge-drainage notches in weir, and baffles in reboilers.

Replacement Time

Corrosion in the shell-and-tube-type heat-exchange equipment has been unusually severe. Even though major retubing was done during regular inspection shutdowns of the unit, there have been frequent unexpected failures which occurred during operating periods.

The depropanizer charge-bottoms exchanger tube bundle had to be retubed or replaced five times in 65 months. The shell was replaced once, and thin spots on the new shell were wash-welded during the same period of time. Admiralty tubes were substituted for steel at the time of the second retubing, with a slight improvement in life. The debutanizer reboiler, which had steel tubes, was retubed or replaced six times in 61 months. These failures, having taken place in relatively hot streams, suggested the presence of a corrosion reaction accelerated by heat.

Admiralty tubes were used in the depropanizer and debutanizer condensers. The depropanizer condenser required four retubings because of corrosion from the process side over 5 years' operation. The debutanizer condenser required retubing once after 4 years of service, also because of corrosion from the process side.

The original steel tubes of the absorber charge cooler were replaced with steel after 16½ months of service, and then with 70-30 copper-nickel after 18½ months of service. Corrosion on the process side of both metals was noticeable, but not to the same degree as that experienced at other places in the gas plant.

Corrosion Causes

In searching for a possible explanation for corrosion in the depropanizer overhead stream and in the absorber charge stream, it was found that quantities of water were associated with these streams. It was postulated that corrosive chemicals carried in water might be responsible in some degree for corrosion having taken

Leaders in Pipe Protection for a Quarter Century

HILL, HUBBELL *Announces* A New Pipe Protection Plant in the Chicago Area

Hill, Hubbell's new steel pipe coating and wrapping plant, located in Hammond, Indiana, will begin operation June 15, 1951.

This central location is in the heart of the vast mid-western steel pipe producing area which includes East Chicago, Gary, Indiana Harbor, Milwaukee and South Chicago.

Customers in the west and southwest can now take advantage of the Hill, Hubbell process with faster deliveries.

Our new facilities will include "stop-over privileges" for pipe to be coated and wrapped in transit on minimum freight rates.

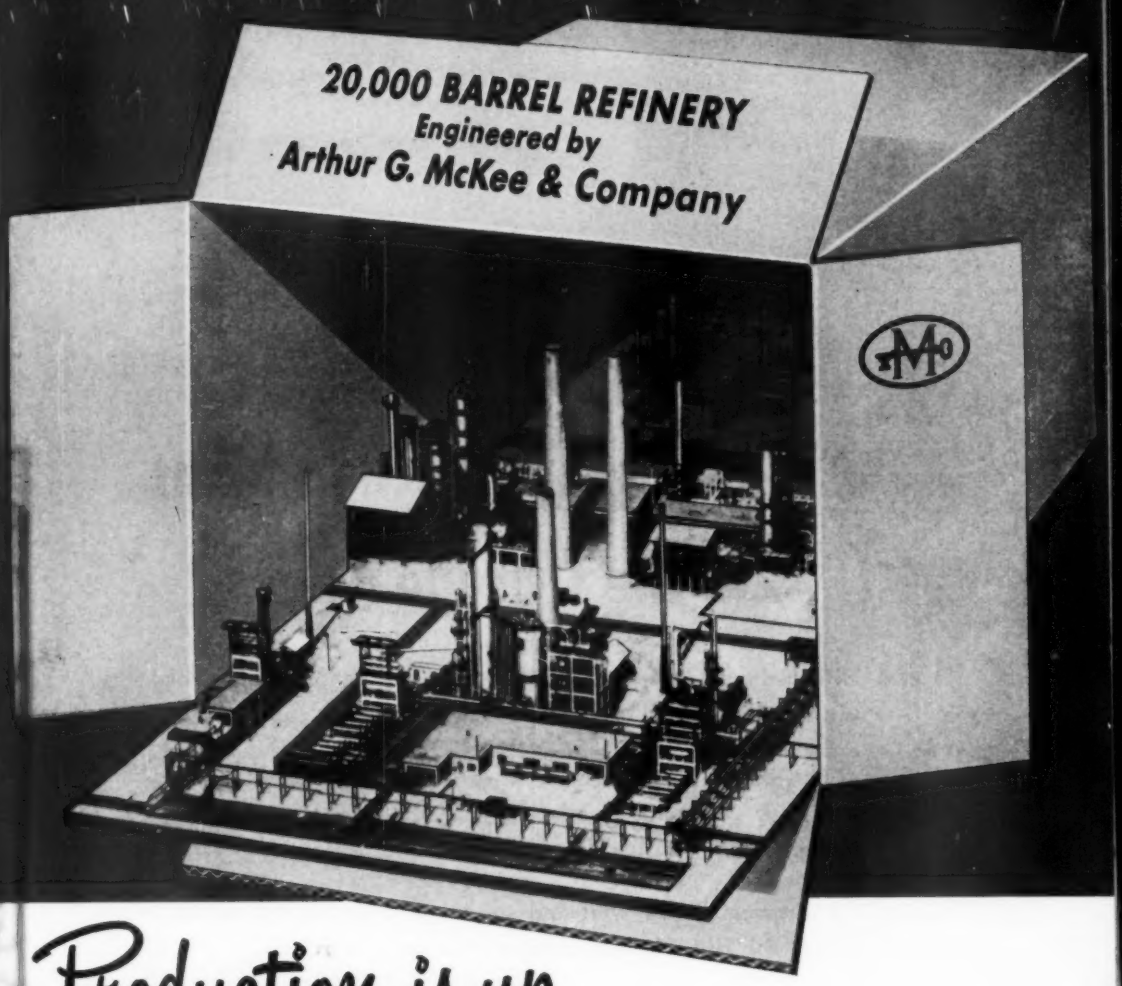
The new plant has ample space for storage of pipe to be coated and wrapped as you need it.

If you'd like to know more about this new plant, and the advantages of factory coated pipe, please write —

Hill, Hubbell and *Company*

Division of GENERAL PAINT CORPORATION

Headquarters: 3091 Mayfield Road, Cleveland 18, Ohio



Production is up

ON NEW "TOOLS" FOR PETROLEUM REFINING

McKEE is engineering and constructing complete refineries, individual processing units and other refining facilities in many locations. The Refinery Division of this organization will continue to devote every effort toward keeping pace with the Refining Industry's expansion program.

DESIGN, ENGINEERING AND CONSTRUCTION FOR THE PETROLEUM REFINING AND IRON AND STEEL INDUSTRIES

McKee Engineering

Arthur G. McKee & Company • Established 1905

Headquarters: McKee Building, 2300 Chester Avenue, Cleveland 1, Ohio. *New York:* 30 Rockefeller Plaza, New York 20, N.Y. *Tulsa:* 918 First National Bank Building, Tulsa 3, Okla. *England:* The Iron and Steel Division of Arthur G. McKee & Company, is represented by Head, Wrightson & Co., Ltd.

place. The theory that water-soluble chemicals influenced corrosion was supported by a comparison of the depropanizer and the debutanizer condensers.

The depropanizer condenser bundle was badly scaled up and fouled. The debutanizer condenser bundle presented a relatively clean condition. and shows no significant corrosion to date. It is felt that the relative dirtiness and abundance of corrosion products in the depropanizer condenser, as compared to the debutanizer condenser, may be attributed to the relative quantities of water present in the streams.

The intermediate amount of corrosion and scale found present in the absorber charge cooler is felt to be the result of an intermediate quantity of water having passed through the cooler. Bundles in relatively hot streams experienced corrosion. Bundles in relatively cool streams with large amounts of water experienced corrosion. In relatively cool streams where water was absent, the corrosion experienced was negligible.

Corrosion Survey

It was determined, from qualitative analytical work, that the principal corrosives present were hydrogen sulfide, ammonia, and unidentified organic acids, in water solution. Accordingly, a complete gas-plant corrosion survey was made; and the concentrations, in per cent by weight of corrosives in water, plus water present in gallons per day, were estimated for the various streams of the gas plant. Results of this survey are as follows:

1. Water entering the gas plant from the cracked-oil tower overhead separators:

(a) Water vapor with gas feed to compression system: 3,850 gal. per day, as liquid. Water condensate at compression plant from north first-stage separator: pH, 8.5; ammonia, 0.07 per cent; hydrogen sulfide, 0.12 per cent.

(b) Entrained water with liquid hydrocarbon from north cracked-oil tower overhead separator: 850 gal. per day; pH, 8.5; ammonia, 0.035 per cent; hydrogen sulfide, 0.054 per cent.

(c) Entrained water with hydrocarbon from south cracked-oil tower overhead separator: 300 gal. per day; pH, 8.0; ammonia, 0.42 per cent; hydrogen sulfide, 0.081 per cent. Total: 5,000 gal. per day.

2. Distribution of water through the depentanizer:

(a) Water charged to depentanizer: 300 gal. per day; pH, 8.0; ammonia, 0.042 per cent; hydrogen sulfide, 0.081 per cent.

(b) Water leaving depentanizer overhead (plus reboiler leak at time of survey): 719 gal. per day; pH, 7.6; ammonia, 0.083 per cent; hydrogen sulfide, 0.18 per cent.

(c) Water leaving depentanizer bottom: 104 gal. per day; pH, 6.3; organic acids (as acetic acid), 0.006 per cent.

3. Distribution of water through the depropanizer:

(a) Water charged to depropanizer: 2,090 gal. per day; pH, 8.5; ammonia, 0.30 per cent; hydrogen sulfide, 0.53 per cent.

(b) Water leaving depropanizer overhead: 290 gal. per day; pH, 7.7; ammonia, 0.85 per cent; hydrogen sulfide, 1.52 per cent.

(c) Water leaving depropanizer bottom: 1,800 gal. per day; pH, 8.0; ammonia, 0.002 per cent; hydrogen sulfide, 0.004 per cent.

4. Distribution of water through debutanizer:

(a) Water charged to debutanizer: 1,800

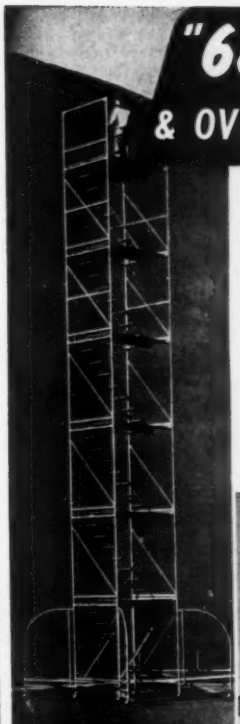
"68% SAVED ON TANK & OVERHEAD MAINTENANCE"

reports Superintendent A (name on request) with

Aluminum Alloy

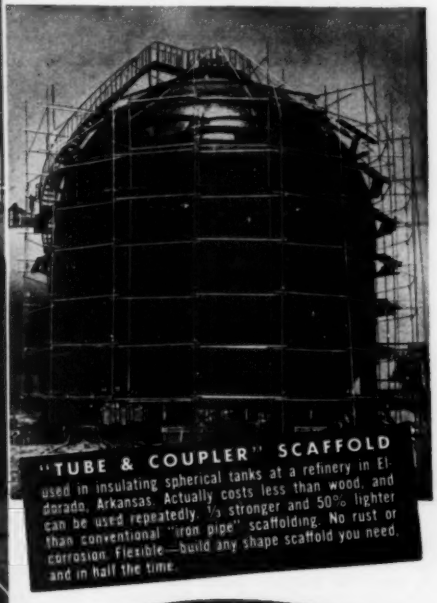
"UP-RIGHT" SCAFFOLDS

Here's a completely new and faster way to get up in the air and move with the job. Petroleum users everywhere report time and labor savings over old-fashioned methods. In fact, savings on even single jobs more than covered the cost of the scaffolds. Indispensable for efficient tank painting, inspection, control, gaging and general overhead maintenance. Eliminates need for many costly fixed stairways and ladders. No rust . . . no corrosion . . . non-sparking.



15 MINUTES TO ERECT 45 FT. "MOBILE TOWER"

A tower of any other height desired can be erected by using the required number of standard 6' or shorter sections. Patented one-piece section has built-in stairway. Folds flat for storage.



"TUBE & COUPLER" SCAFFOLD used in insulating spherical tanks at a refinery in El-dorado, Arkansas. Actually costs less than wood, and can be used repeatedly. ½ stronger and 50% lighter than conventional "iron pipe" scaffolding. No rust or corrosion. Flexible—build any shape scaffold you need, and in half the time.

ROLL-AROUND & SAFETY CAGE

Provides new, faster method for covering entire wall areas of tanks. Can be rigged by one man. Roll-Around is anchored to eyebolt on top of tank. Safety cage is raised or lowered while rolling around.

WRITE FOR DESCRIPTIVE CIRCULAR

Before buying scaffolds insist on a demonstration . . . then buy the best — the one and only

"UP-RIGHT" SCAFFOLDS

Dept. 130 • 1013 PARDEE ST. • BERKELEY, CALIF.

Factories

BERKELEY, CALIF. ● TETERBORO, N. J.

• OFFICES IN ALL PRINCIPAL CITIES •

gal. per day; pH, 8.0; ammonia, 0.002 per cent; hydrogen sulfide, 0.004 per cent.

(b) Water leaving debutanizer overhead: 90 gal. per day; pH, 8.8; ammonia, 0.006 per cent; hydrogen sulfide, 0.004 per cent.

(c) Water leaving debutanizer bottom: 1,710 gal. per day; pH, 5.5; organic acids (as acetic acid), 0.012 per cent.

5. Estimate of water passing through absorber:

(a) Water leaving absorber: 320 gal. per day; pH, 7.3; ammonia, 0.143 per cent; hydrogen sulfide, 0.336 per cent.

Chemical Corrosives

From the foregoing it can be seen that there was normally 5,000 gal. of water per day introduced to the gas plant. One source of water was vapor introduced with the gas from the cracked-oil tower overhead gas and water separators. A second source was entrained water carried along with gasoline from the bottom of each of the separators into the gas plant.

It will also be noted that, at the time of the survey, there was a depentanizer reboiler leak which introduced water into the depentanizer, from whence it progressed overhead, and on into the depropanizer charge. Water which had accumulated in the depropanizer charge accumulator was an alkaline solution containing ammonia and hydrogen sulfide.

In bottom streams, however, such as the depentanizer or debutanizer reboiler, the water was slightly acidic. The water contained ammonium salts of organic acids which had dissociated at reboiler temperatures to produce an acid solution which, in conjunction with corrosion products carried to the reboiler, produced very severe localized attack on reboiler tubes.

It is very likely that the heated depropanizer charge stream and also the depropanizer reboiler stream similarly contained salts which gave acid conditions during actual operation.

Corrosion Products

In addition to corrosive chemicals carried by water in the streams, it was indicated that corrosion products, such as metallic sulfide sludges, were a factor in producing localized attack. The adverse corrosion influence of corrosion-product sludges was emphasized at the time of a debutanizer reboiler failure in January 1949.

Inspection indicated considerable iron sulfide sludge lodged at the bottom of reboiler bundle and also packed around the bottom reboiler tubes. Surface losses of bottom tubes which had been in the sludge averaged 0.020 in. Surface losses of top tubes which were not in contact with the sludge averaged 0.002 in. The bottom tubes were severely pitted, whereas top tubes had a slight uniform attack. Tubes of this bundle had been in service but 3 months.

Preventive Measures

Inasmuch as the corrosion had been so closely connected with water, it was thought that the most practical measures for corrosion prevention should consist of water-removal steps wherever possible in the gas plant. It was recommended that water be removed at four different places:

1. Three hundred gallons per day of water entered with gasoline from the bottom of the south cracked-oil tower overhead separator. It was recommended that this water be removed with a coalescing-type entrained-water separator.

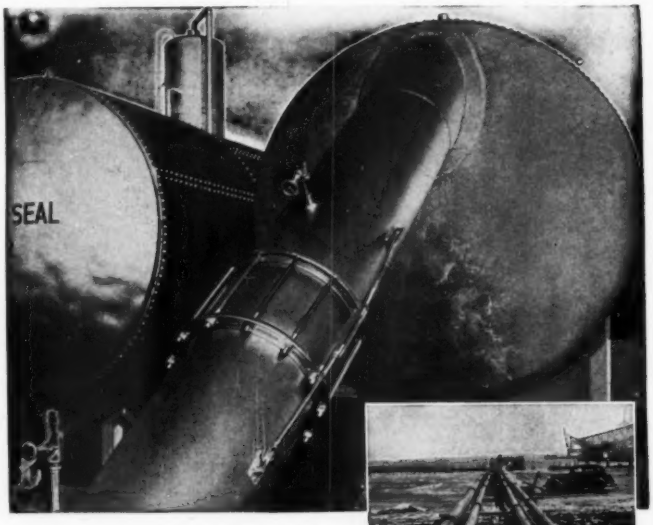
2. Eight hundred and fifty gallons per day of water entered with gasoline from the bottom of the north cracked-oil tower overhead separator. It was recommended that more water-settling capacity be provided at this point. Separation of this stream should be more in line with the efficiency of the present south cracked-oil tower overhead separator.

3. A further source of water in the gas plant consisted of that which had resulted from condensation of water vapor, following the various compression stages, plus water from compressor drip gasoline which becomes entrained in depropanizer charge accumulator hydrocarbon liquid. Although water had been removed at the separators prior to compression and after the first-stage compression, no water was removed after the 140-psi. or the 400-psi. compression. It was suggested that a flood nipple be provided in the absorber bottom outlet, with provisions for a separate water draw from the bottom of this tower.

4. It was recommended that a coalescing-type entrained-water separator be provided at a point upstream of the depropanizer charge exchanger to remove the remaining free water.

It was anticipated that, after water had been eliminated as far as possible

HANDIEST... wherever you have pipe to join



Whether it's an equipment hookup, a field line, or a terminal—anywhere you're joining pipe—the handiest, surest way to get uniformly tight pipe joints is with Dresser Couplings and Long Sleeves.

There's no pipe threading—the only tool you need is a wrench. Dressers give you a "Flexible-Tight" connection every time, day or night, rain or shine, even where pipe ends don't meet.

Get Dressers from your nearest oilfield supply store, or at our Houston warehouse.

"FLEXIBLE-TIGHT"

DRESSER COUPLINGS

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. (One of the Dresser Industries). Houston Office and Warehouse: 1121 Rothwell Street, Houston, Texas. Sales Offices: New York, Chicago, Houston, San Francisco.

it's the results that count!

Top results are insured through the uniform quality of Davison synthetic fluid-type cracking catalysts. Years of experience and research make it possible for Davison to better control physical characteristics and maintain chemical purity of their catalysts. Your requirements can now be supplied in either microspheroidal (M-S*) or ground (DA-1*) form . . . both available in various average particle sizes.

The Davison "D" also stands for dependability. Likewise, you can depend on Davison facilities for the development and production of catalysts for your specific processes.

*T.M.T.D.C.C.

Progress Through Chemistry

THE DAVISON CHEMICAL CORPORATION

Baltimore 3, Maryland

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, PHOSPHATES, PHOSPHATE ROCK, SILICA GELS, SILICOFLUORIDES AND FERTILIZERS

from the gas plant by the proposed measures, trace amounts of corrosives might still remain in small quantities of residual water. Chemical neutralization was then suggested in order to effect further corrosion reduction, if required. To accomplish this, it was thought that ammonium hydrosulfide dissolved in water might be decomposed or rendered inert. Bottom stream ammonia-organic acid salts might be converted to salts less likely to dissociate with heat, such as sodium or amine salts. Provision for such chemical injection was therefore recommended at a point prior to the depropanizer charge - bottoms exchanger.

It will be recalled that the debutanizer reboiler tube failure was connected with iron sulfide sludge which had lodged at the bottom of the reboiler bundle. Indications were that the sludge acted as a coalescing medium for water, or that it was cathodic to carbon steel and may have accelerated corrosion by galvanic effect. It is likely that both influences accelerated the corrosion. Of course, the source of the sludge was in part caused by corrosion of the tubes themselves; but the larger part of the sludge was the result of attack by hydrogen sulfide farther back in the system. Liquid in the system carried sludge particles over to the reboiler. Laboratory tests have also established the increased corrosion tendencies of such sludge under stimulated conditions.

To reduce this corrosion, pending the installation of entrainment separators where they had been recommended, the sludge factor was reduced by notching the bottoms of baffle plates of the tube bundle, and by enlarging the weep hole of the weir plate in the reboiler so as to encourage more thorough drainage of water and sludge to the bottom process outlet connection. A sketch of the drainage and drawoff arrangement is given in Fig. 1.

This bundle was open for inspection 3 months later. Little sludge was found, and no further measurable metal loss had been experienced on the bottom row of tubes, viz., the same row which had failed after having been submerged in sludge and water in the previous 3 months.

The bundle was not open for inspection for another 7 months, when again some sludge deposits were found in the middle tubes near the bottom of the bundle, and when the bottom tubes showed slight additional corrosion losses. Inasmuch as the bundle was already corroded at the time the weir notching was done, these losses, as well as over-all additional losses, were sufficient to warrant the installation of a newly retubed bundle.

Six months elapsed before the next inspection of the bundle. At this time the tubes were found to be pitted and corroded, with the area of deepest pitting in the top portion of the bundle. Although the tubes had not failed, earlier unsatisfactory experience prompted a conservative decision to avoid the possibility of an unexpected failure, and the bundle was retubed. These results indicate that the baffle notching and drainage of reboilers had served to avoid emergency gas-plant shutdowns resulting from failure of the bottom rows of tubes. However, corrosion—although at a reduced rate—was still taking place in the reboiler because water was passing through the bundle.

Water-Removal Measures

Three of the recommended measures for water removal subsequently were put into effect. The first was the installation of a flood nipple in the bottom of the absorber tower, with the establishment of regular manual water withdrawal every 4 hours. Water is regularly drawn from this point. It is believed that this procedure has accomplished its purpose by lessening the load on the entrainment separator placed farther downstream in the system.

The second water-removal measure was the installation of a coalescing-type entrainment separator on the de-

Converting

COOLING TOWERS

from atmospheric type to INDUCED DRAFT

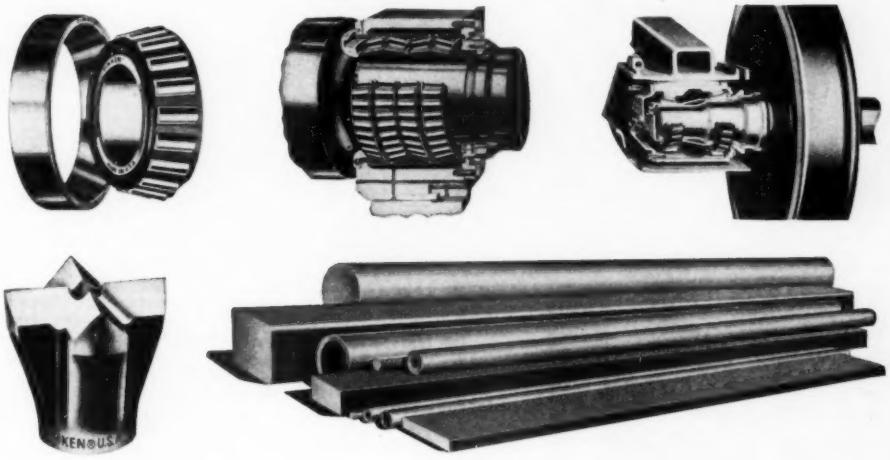
- IMPROVES PERFORMANCE
- CONSERVES GROUND SPACE
- RESTORES CONDITION
- ENHANCES APPEARANCE
- REDUCES WATER SPRAY LOSS

These and other profitable advantages are available through HUDSON inspection and repair services.

HUDSON
ENGINEERING CORPORATION
FAIRVIEW STATION • HOUSTON, TEXAS

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.



Little words that mean a lot

There's no room for compromise, doubt or question in those brief words above. They mean: "Timken" is the registered trade-mark of The Timken Roller Bearing Company. And that meaning is mighty important to you.

The trade-mark "Timken" assures you of getting the highest quality tapered roller bearings, fine alloy steel bars, steel tubing or rock bits—all products of The Timken Roller Bearing Company.

That's why it pays to remember that "Timken" *is* a trade-mark, not a type of product. That it isn't really a product of the Timken Company unless it's backed up with this trade-mark.

Why not make it a habit to look for the trade-mark "Timken" when you buy tapered roller bearings, alloy steel bars, tubing or rock bits. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION ✳

pentanizer-feed gasoline stream. This entrainment separator is simply a small vessel which contains excelsior as a coalescing agent and which has a small leg for the purpose of trapping the separated water. The trap has an automatic liquid-level control which provides for disposal of separated water.

This separator has been very successful in operation, and has required no particular servicing or attention to accomplish its job. Water removal in this system was for the purpose of providing corrosion protection for the depentanizer charge - bottoms exchanger, the depentanizer reflux condenser, and the depentanizer reboiler. This section of the gas plant has not been open to inspection since the installation of drying facilities, and it is not possible at this time to report results.

The third water-removal measure was the installation of a coalescing-type entrainment separator on the depropanizer charge stream, following its juncture with the absorber bottoms stream. At this point the stream is all in a liquid state, and the water present is susceptible to removal by coalescing means. Like the depentanizer charge entrainment separator, this separator also utilizes excelsior for a water-coalescing agent.

Although the water-removing capacity of this separator is larger than that for the depentanizer charge, its efficient operation depends to a large extent on adequate manual removal of excessive water from the depropanizer charge accumulator. Excess water still continues intermittently to load the charge accumulator, and will do so until such time as the separator efficiency on the north cracked-oil tower overhead stream is increased. The construction and location of the charge accumulator are such that its use as a water separator is difficult and inefficient, and it follows that the manual water-drawing operation is an inefficient one.

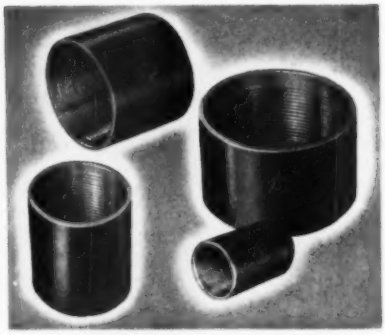
This difficulty is especially significant because large amounts of water were allowed to pass into the depropanizer charge stream during an initial 2-month period before water-drawing procedures at the depropanizer charge accumulator were emphasized. It is likely that intermittent introduction of water into the depropanizer charge has occurred even during the following period of operation.

The depropanizer - debutanizer section of the gas plant was open to inspection January 1951—7 months after water-removal measures. It is possible in this short period of time to describe results which are considered indications of successful corrosion prevention.

Definite improvement in corrosion experience was found in the depropanizer charge - bottoms exchanger. Each previous year this tube bundle had been so extensively corroded on the shell side that retubing was necessary. During the last inspection shutdown the corrosion was minor for the bundle as a whole, and was severe at only two places. A small amount of sludge had lodged between the tubes and baffle at the first baffle, and between the tubes and tube sheet at the floating tube sheet. The sludge and corrosion had been confined to these two places only on the bottom three rows of tubes. At the point of sludge contact with the tube, the tubes had corroded areas 1 to 2 in. long.

It is emphasized that, except for these two areas of sludge accumulation, at no place had the tubes lost significant amounts of metal. Previously all tubes of this bundle had shown excessive corrosion for a similar period of operation. It is believed that the corrosion in this exchanger reflects the periodically inefficient water removal at the depropanizer charge accumulator, as well as consequent interference with operation of the entrainment separator which has already been described. There is little doubt that, with water substantially eliminated from the charge stream, future corrosion will be negligible in this exchanger.

Evidence was also found that water removal was not complete, and that corrosion had not been altogether stopped in the depropanizer reboiler.



THREADS ACCURATE in form, height, angle, and lead. Couplings made to A.P.I. and A.I.S.I. specifications.

THREADS ACCURATE in height, angle, taper, and gauging. Flanges are manufactured to A.S.A. standards.

AMAZING THREAD ACCURACY

...the feature that pays off in HARRISBURG Couplings and Flanges

These superior products are bored and threaded on special machines according to methods *Harrisburg* perfected years ago. *Compare them point for point with any Couplings and Flanges on the market today.* Ask your nearest distributor, or write us for catalogs and prices.

DISTRIBUTORS

HOUSTON 1 • Henry H. Paris, Distributor, Inc.
LOS ANGELES 54 • Republic Supply Co. of California
LOS ANGELES 58 • Howard Supply Company
TULSA 1 • W. C. Norris, Manufacturer, Inc.

SEE OUR CATALOG IN THE COMPOSITE CATALOG

HARRISBURG STEEL CORPORATION

Custom-Built Quality Products in Quantity

98 YEARS IN PENNSYLVANIA'S CAPITAL

Harrisburg 6, Pennsylvania

PEERLESS *Hi-Surface Horizontal* SEPARATORS

Are...NEW...DIFFERENT!

Typical Installation of Major Oil Company in Scurry County.

By utilizing New Principles of Separation, they are achieving Unequalled Performance for High Pressure and Extreme Foaming Conditions.

PEERLESS *are*

***SPECIALISTS** in the*

***SEPARATION** of*

LIQUIDS and GASES

THEY FEATURE:

1. **NEW . . . DIFFERENT** *Extremely High Scrubbing Surface*
2. **NEW . . . DIFFERENT** *Means of Coalescence*
3. **NEW . . . DIFFERENT** *Simple Sensitive Torque Tube Leveltrol with no bleed pilot*

WRITE TODAY FOR FULL INFORMATION ABOUT PEERLESS SEPARATORS AND NEW BULLETINS.

PEERLESS MFG. CO. DALLAS TEXAS

PEERLESS MANUFACTURING COMPANY

Walnut Hill Lane at Old Denton Road

P. O. Box 7193 DALLAS, TEXAS DI-8431

AGENTS IN:

Hobbs, N. M., Houston, Odessa, Wichita Falls, Alice, and El Paso, Texas, Tulsa, Denver, Philadelphia, Phoenix, Los Angeles, Boston, Cleveland, New York City, Buffalo, Chicago, Richmond, Louisville.

This reboiler contained excessive deposits of sludge and evidence of slight corrosion on the bottom tubes. However, the corrosion was not so severe as had formerly been experienced, and it was not necessary to retube the bundle.

As in the case of the depropanizer charge-bottoms exchanger, it is felt that the remaining corrosion in this case is largely the result of occasional inadequate water removal at the depropanizer charge accumulator and at the entrainment separator. As measures are taken to increase separator efficiency in streams which feed the depropanizer accumulator, the intermittently high load on the depropanizer entrainment separator will be eliminated. Depropanizer reboiler corrosion then should be reduced to minor proportions.

Excellent corrosion reduction had occurred in the debutanizer reboiler, although large quantities of sludge deposits again were found in this vessel. The reboiler tubes were not corroded at all, even at the bottom of the bundle, where they had been surrounded by sludge, because of the absence of water from the reboiler. The water-removal program is indicated as successful in eliminating severe corrosion at this reboiler, where formerly attack was intolerable.

After no accumulation for 2 years, the reappearance of substantial amounts of sludge deposits in the reboiler was surprising. This reoccurrence may be explained by the fact that there is now a lack of water in sufficient quantity in the reboiler to flush deposits from the bundle to the outlet nozzle.

There were two immediate operational benefits which resulted when the driers had been put in operation. These are mentioned as indicative of unexpected advantages—actually having no connection at all with corrosion—which may result from a corrosion-control program.

Operational Benefits

One benefit is the reduction of caustic consumption at the gas plant. It was necessary to charge the debutanized gasoline caustic scrubber with fresh caustic at least every other day, largely because of dilution of caustic with excess water which passed through the gas plant. Initiation of the water-removal operation immediately stabilized the consumption of caustic in this scrubber, and it was not necessary thereafter to recharge with fresh caustic more than once a month.

A second benefit was distinctly improved operation of both the depropanizer and the debutanizer towers. This had been somewhat erratic because of water accumulation and because of slugging into the reboiler. Water drainage through the reboilers caused by notching of baffle plates, as well as the removal, later on, of entrained water from the feed stream eliminated this difficulty.

It is pertinent to review the economic justification for the installation. Experience previous to the installation of entrainment separators established a cost of approximately $1.20 per square foot per year—this for direct material and labor charges for maintenance of heat-exchange surface in the gas plant. The total installation cost of the separators and the chemical injection equipment amounted to $0.45 per square foot of gas-plant exchanger surface. Results to date leave no doubt that the installation is economical, based on direct maintenance costs alone. Larger and less tangible economic benefits have also resulted from improved continuity of operation.

References

1. F. A. Rohrman, "The Economic Aspects of Corrosion," Petroleum Refiner 26 (6) 85-90 (1947).

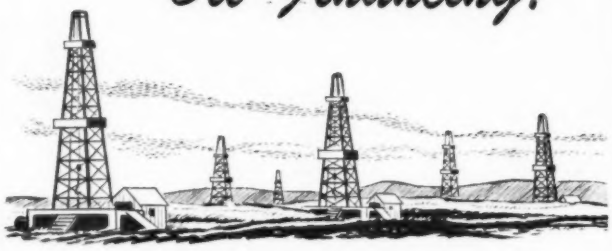
2. E. Q. Camp and Cecil Phillips, "Neutralization As a Means of Controlling Corrosion of Refinery Equipment," Corrosion 6 (2) 39-46 (1950).

3. H. L. Bedell and V. W. Hatchett, "The Use of Chemicals for Retarding Corrosion," Proc. A.P.I. 28M (III) 9-17 (1948).

4. Nathan Shofer, "Corrosion Problems in a Fluid Catalytic Cracking and Fractionating Unit," Corrosion 5 (6) 182-8 (1949).

5. R. H. Newton, G. S. Dunham, and T. P. Simpson, "The T.C.C. Catalytic Cracking Process for Motor-Gasoline Production," Natl. Petroleum News 37 (23) 441 (1945).

Thinking of Oil Financing?



Owners and producers of oil and natural gas are invited to consult with our Oil Department on their financial problems.

All inquiries on petroleum and related matters will receive prompt attention.

Empire Trust Company

NEW YORK

Dowtown Office
120 Broadway
Equitable Building

Uptown Office
7 West 51st Street
At Rockefeller Center

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

MIDWEST WELDING FITTINGS
Improve Piping Designs and Reduce Costs

90° ELBOWS

REDUCING 90° ELBOWS

45° ELBOWS

LAP-JOINT STUB ENDS

REDUCERS

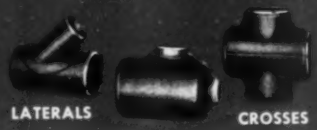
CAPS

SADDLES

SLEEVES

RETURN BENDS

TEES


LATERALS

CROSSES

REDUCING-ON-RUN TEES

SHAPED NIPPLES

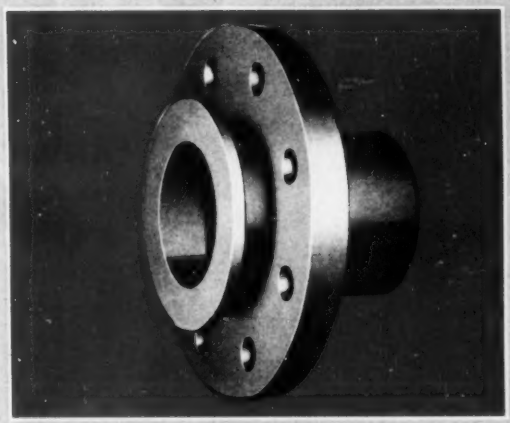
FLANGES

IN WELDED PIPING SYSTEMS

SAVE TIME and MONEY on EQUIPMENT CONNECTIONS

by using MIDWEST

LAP JOINT STUB ENDS



Substantial savings of time and money result if Midwest Lap Joint Stub Ends are used when making connections to valves, equipment or other flanged outlets in welded piping systems. They have important advantages over flanges welded to the pipe.

The swivel flange makes it unnecessary to line up the bolt holes before welding. Setting up is quick and simple because no special clamps or jigs are required to hold the face of the flange absolutely perpendicular to the axis of the pipe. Field crews report as high as 25% saving in erection time for making up a joint using Midwest Lap Joint Stub Ends in comparison with rigidly fixed flanges.

Midwest Welding Fittings improve piping—save money. Get in touch with the distributor near you.

3719

MIDWEST PIPING & SUPPLY COMPANY, Inc.

Main Offices: 1450 South Second Street, St. Louis (4), Mo.
***Sales Offices:* New York (7), 30 Church St.**
Chicago (3), 79 West Monroe St. • Los Angeles (33), 520 Anderson St. • Houston (2), 1213 Capitol Ave. • Tulsa (3), 224 Wright Bldg. • Boston (27), 426 First St.

Be sure with Pure

Producers • Refiners • Marketers

of petroleum products

THE PURE OIL COMPANY

Marketing Offices in Principal Cities of the Eastern, Central and Southern States
General Offices, Chicago, Illinois

Effects of Sodium Chloride on Setting Properties of Oil-Well Cements

by N. C. Ludwig

IT is now generally recognized[1,2] that the liquid phase of a portland cement paste is primarily a solution of calcium, potassium, and sodium sulfates and hydroxides which tends to satisfy the equilibrium conditions required by the equation:

$$CaSO_4 + 2(K,Na)OH = (K,Na)_2SO_4 + Ca(OH)_2$$

Data for the solubilities of calcium sulfate and calcium hydroxide in solutions of KOH as determined at 86° F. by Hansen and Pressler[3] and at 200° F. in this laboratory are plotted in Fig. 1. The concentrations of CaO and SO_3 in the liquid phase of a slurry of portland cement after about 15 minutes agitation approach these equilibrium values.

Any material which will force the reaction of the above equation in either direction is likely to have an effect upon the setting and thickening time of cement slurries. Such materials, one of which is sodium chloride, appear to exert their influence by true chemical reactions. However, other materials, notably organic compounds, may affect the setting and thickening-time properties of cement slurries because of physical reactions such as adsorption.

Many sodium salts, when added to the cement slurry, will react with calcium hydroxide, which is readily available from the hydrolysis of the cement minerals, to form relatively insoluble calcium salts and soluble NaOH. Examples of such salts are sodium carbonate, silicate, fluoride, and acid pyrophosphate. The effect of the increase in the Na_2O content of the liquid phase, as shown in Fig. 1, is to increase the concentration of SO_3 and slightly decrease the concentration of CaO in the solution.

It has been shown[1,2,4] by a number of investigators that alkali hydroxides greatly accelerate the rate of setting of portland-cement pastes. However, when organic additives are present in the cement, as in the case of retarded oil-well cements, the addition of NaOH may have an entirely different effect on the setting properties. This may be due to a chemical change of the retarder caused by the NaOH, or to a change in the composition of the liquid phase of the cement paste which, in turn, affects the solubility of the retarder.

Effect of NaCl on Rate of Setting

Sodium chloride differs from the salts discussed above in that it does not produce an insoluble calcium salt.

Lerch[5] reports that NaCl, in the amount of 2 per cent or less, increases the rate of hydration of portland cement at early ages. The results of tests made on five cements show that the greatest acceleration occurs within the first few hours.

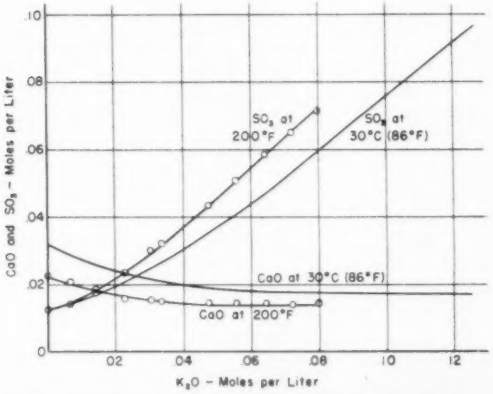
Lea and Desch[4] state that NaCl is sometimes deliberately added to portland cement to shorten the setting time in cold weather. They also state that NaCl produces less effect than $CaCl_2$ on the setting of cement, and that the effect is erratic.

Cooperative work now being done by the A.P.I. study committee on oil-well cements, Mid-Continent district, involves the testing of the effect of NaCl and a number of drill-mud additives. Results of these tests show that small quantities of NaCl, up to about 4 per cent by weight of cement, greatly accelerate the rate of setting; whereas larger quantities, from about

THE AUTHOR

N. C. Ludwig, of Universal Atlas Cement Co., Buffington, Ind., was born in Chambersburg, Pa., and received his B.S. degree in electrical engineering from Lewis Institute (now Illinois Institute of Technology) in 1931. He received his M.S. degree from University of Chicago in 1936. In 1937 Ludwig joined Universal Atlas Cement Co. as research engineer at Kearny, N. Y., and since 1941 has been section leader in charge of research on oil-well cements.

This paper was presented at the spring meeting of the Mid-Continent District, A.P.I.'s Division of Production, Amarillo, March 21-23.



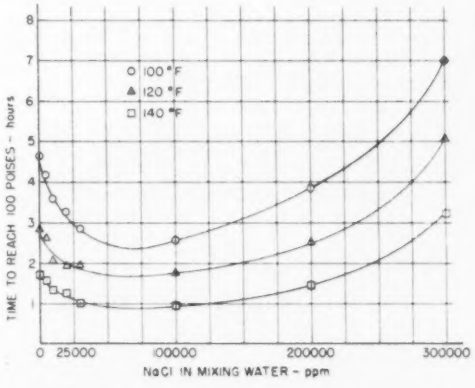


Fig. 1—(Left) Concentrations of CaO and SO_3 in solutions of KOH at 200° F. and 30° C. (86° F.). Data for 30° C. from paper by Hansen and Pressler. Fig. 2—(Right) Effect of sodium chloride on the thickening time of A.S.T.M. type I cement.

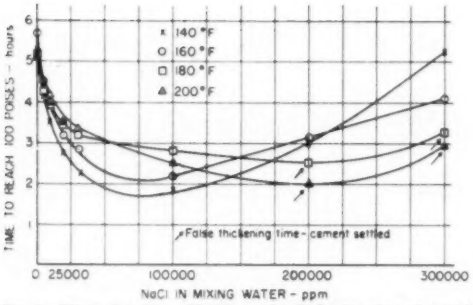


Fig. 3—Effect of sodium chloride on the thickening time of retarded oil-well cement. Halliburton consistometer.

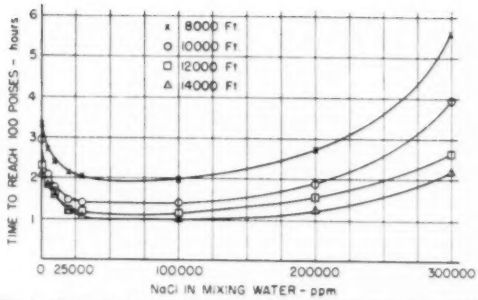


Fig. 4—Effect of sodium chloride on the thickening time of retarded oil-well cement. Pressure consistometer.

8 to 10 per cent, do not have a very great effect upon setting times.

Effect of NaCl on Liquid-Phase Composition

Tricalcium aluminate, one of the compounds in portland cement, reacts with a number of salts,[1,2] to produce double salts as illustrated below for calcium sulfate and calcium chloride.

$$3CaO \cdot Al_2O_3 + 3CaSO_4 + 31H_2O = 3CaO \cdot Al_2O_3 \cdot 3CaSO_4 \cdot 31H_2O \quad (1)$$

$$3CaO \cdot Al_2O_3 + CaCl_2 + 10H_2O = 3CaO \cdot Al_2O_3 \cdot CaCl_2 \cdot 10H_2O \quad (2)$$

When a cement slurry contains both sulfate and chloride, the reaction of Equation 1 proceeds almost to the exclusion of that of Equation 2 until most of the sulfate has been combined. Then the reaction of Equation 2 becomes fairly rapid. Data demonstrating this are given in Table 1. These data were obtained by shaking slurries of 200 g. of a Type I cement containing 0 and 1 per cent of NaCl with 150 ml. of water for various periods of time at room temperature. The slurries were then filtered and the filtrates were analyzed for sulfate and chloride. These methods are described by Hansen and Hunt.[6]

It will be noted that the concentrations of sulfate remained approximately constant for a period between 8 and 12 hours for the slurry containing no NaCl, and for a period between 5 and 8 hours for the slurry containing NaCl, and then slowly decreased. The concentration of the sulfate remains constant even though it is reacting as illustrated in Equation 1 because the solubility of gypsum is such that only a small portion of the amount in the cement can go into solution. Hence the concentration in solution is maintained at approximately the saturation value until all of the solid calcium sulfate has been converted to calcium sulfoaluminate by the reaction of Equation 1. The decrease in the period during which the solution was saturated with sulfate when the solution contained NaCl indicates that NaCl accelerates the rate at which calcium sulfate is converted to the calcium sulfoaluminate.

The compositions of the liquid phases of six cement slurries of an A.S.T.M. Type I and a retarded oil-well cement were determined by stirring at either 120° F. or 200° F. for 30 minutes, filtering on a Baroid mud filter, and analyzing the filtrates for CaO, SO_3, Na_2O, K_2O, Cl, and OH. The data for these pastes and extracts are given in Table 2, from which it may be seen that the NaCl remains in solution and increases the total salt content of the liquid phase. They also show that additions of NaCl increase the solubility of calcium sulfate in these solutions.

TABLE 1—CONCENTRATIONS OF SULFATE AND CHLORIDE IN LIQUID PHASE OF CEMENT PASTES

(Slurries of 200 g. cement plus 150 ml. water were shaken at room temperature)

	Concentrations of SO_3 and Cl at period indicated, grams per liter						
	30 min.	3 hr.	5 hr.	8 hr.	12 hr.	16 hr.	24 hr.
Type I cement without NaCl:							
SO_3	1.371	1.365	1.396	1.354	0.143	0.030	0.000
Type I cement plus 1.0% NaCl:*							
SO_3	2.113	2.273	2.428	1.367	0.066	0.015	0.000
Cl	8.134	7.938	7.856	7.722	7.330	7.056	5.704

*1.0 per cent NaCl is equivalent to 7.997 g. per liter Cl.

TABLE 2—COMPOSITIONS OF EXTRACTS FROM CEMENT SLURRIES

NaCl in mixing water (p.p.m.)	Composition of extracts, moles per liter						NaCl equivalent of Cl_2 in extracts* (p.p.m.)
	SO_3	CaO	Cl_2	$(OH)_2$	K_2O	Na_2O	
Retarded oil-well cement:†							
None	0.0349	0.0178	0.0000	0.0288	0.0329	0.0068	0
10,000	0.0443	0.0249	0.0876	0.0266	0.0340	0.0935	10,249
30,000	0.0565	0.0327	0.2603	0.0244	0.0380	0.2645	30,455
A.S.T.M. Type I cement:‡							
None	0.0249	0.0270	0.0002	0.0315	0.0170	0.0123	23
10,000	0.0338	0.0362	0.0882	0.0325	0.0170	0.0968	10,319
30,000	0.0450	0.0459	0.2647	0.0331	0.0170	0.2677	30,970

*Moles per liter of Cl_2 × 117,000 = p.p.m. of NaCl. †100 g. cement plus 40 ml. water, stirred 30 minutes at 180° F. ‡100 g. cement plus 48 ml. water, stirred 30 minutes at 120° F.

TABLE 3—DATA SHOWING EFFECT OF SODIUM CHLORIDE ON THE COMPRESSIVE STRENGTH OF A.S.T.M. TYPE I CEMENT

NaCl in mixing water (p.p.m.)	Compressive strength at 24 hours of 2-in. cubes cured at temperatures indicated (psi.)		
	100° F.	120° F.	140° F.
None	2,108	2,917	4,023
5,000	2,763	4,030	4,127
10,000	2,962	4,080	4,555
20,000	3,320	4,417	4,693
30,000	3,145	4,218	4,632
100,000	3,067	3,288	3,513
200,000	2,470	2,650	2,960
300,000	1,484	2,003	2,220

TABLE 4—DATA SHOWING EFFECT OF SODIUM CHLORIDE ON THE COMPRESSIVE STRENGTH OF RETARDED OIL-WELL CEMENT

NaCl in mixing water (p.p.m.)	Compressive strength at 24 hours of 2-in. cubes cured at temperatures indicated (psi.)		
	140° F.	160° F.	180° F.
None	2,349	2,715	5,023
5,000	2,910	4,092	6,183
10,000	3,350	4,197	6,287
20,000	4,090	4,510	6,978
30,000	3,690	4,518	6,920
100,000	4,403	5,253	6,797
200,000	4,437	5,255	5,793
300,000	1,992	2,208	2,379

Effect of NaCl on the Thickening Time and Strength

Data for thickening times with various concentrations of sodium chloride in the mixing water were determined for the Type I cement and the retarded oil-well cement, in Halliburton and pressure thickening-time testers, in accordance with methods of A.P.I. Code 32, second edition, June 1950. The sodium chloride was dissolved in

"K" Casing Swab with "GW" Cups

FLEXIBILITY

that means every-drop casing swabbing!

GUIBERSON "GW" CUPS

hug casing wall—
automatic seal,
controlled pipe contact

- Unequalled in rough or mixed casing strings
- Stout, flexible lip brings up every drop
- Won't down-swab or hang on casing collars
- Perfect for unloading shallow wells
- Abrasion resistant compound—takes up own wear
- Performs better—lasts longer—costs no more
- Interchangeable on famous "K" Swab Mandrel

Type "K" Swab with "GW" and "K" cups offers greatest size range on the market. Type "A" Swab with thick-lipped "A" Cup made in a wide size range including many odd and obsolete casing sizes.

Write TODAY for descriptive Swab pamphlet and new Guiberson catalog!

THE

GUIBERSON

CORPORATION

the mixing water, and 46 ml. of the solution was used with 100 g. of the Type I cement and 40 ml. was used with 100 g. of the retarded oil-well cement. These data are illustrated in Figs. 2, 3, and 4. The compressive strengths of these slurries, determined in accordance with the method of A.P.I. Code 32, are given in Tables 3 and 4.

The results of these tests show that:

1. Additions of 5,000 to about 200,000 p.p.m. of sodium chloride to the mixing water decreased the thickening times of the slurries of both cements. The decrease in thickening time increased as the concentration of the salt increased up to 100,000 p.p.m. and then decreased. When the concentration of salt was 300,000 p.p.m. the thickening times were longer than those of the slurries containing no added sodium chloride, except in the case of the retarded oil-well cement when tested in the Halliburton thickening-time tester.

2. In general, the compressive strengths at 24 hours of 2-in. cubes of Type I cement slurries, cured at 100°, 120°, and 140° F., increased with increasing salt content of the mixing water, up to the concentration of 30,000 p.p.m.; and then decreased as the salt concentration increased.

3. The compressive strength at 24 hours of 2-in. cubes of the retarded oil-well cement slurries, cured at 140°, 160°, and 180° F., increased with increasing salt content of the mixing water, up to the concentration of 100,000 p.p.m.; and then decreased as the salt concentration increased.

References

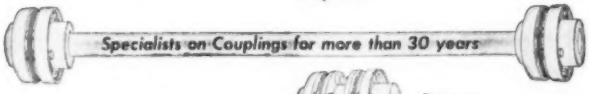
1. R. H. Bogue, "Chemistry of Portland Cement," Reinhold Publishing Corp., 1947.
2. W. C. Hansen and E. E. Pressles, Ind. & Eng. Chem. 39, 1280, Oct. 1947.
3. William M. Lerch, Portland Cement Association Research Report, Apr. 1944.
4. F. M. Lea and C. H. Desch, "The Chemistry of Cement and Concrete," Arnold & Co., London, 1935.
5. G. L. Kalousek, C. H. Jumper, and J. J. Tregoning, J. Res. NBS, 30, 3, Mar. 1943.
6. W. C. Hansen and J. O. Hunt, A.S.T.M. Bulletin 161, 50, Oct. 1949.

THOMAS *Flexible* ALL METAL COUPLINGS

FOR POWER TRANSMISSION • REQUIRE NO MAINTENANCE

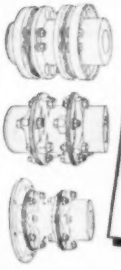
REFINERS! PIPE LINE MEN! DRILLING ENGINEERS! LABORATORY TECHNICIANS!

All can use Thomas Couplings to their advantage on Pumps, Compressors, Cooling Towers, Rigs or any tough job where continuous operation and dependability are required.



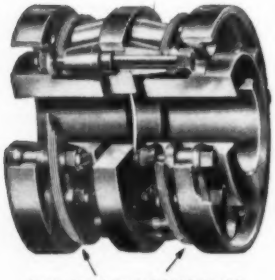
Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
1/2 to 40,000 HP
1 to 30,000 RPM



BACKLASH FRICTION WEAR and CROSS-PULL are eliminated

Lubrication is not required!



PATENTED FLEXIBLE DISC RINGS

THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

• • •

NO MAINTENANCE PROBLEMS.

• • •

ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Miniature Seismograph

(Continued from page 97)

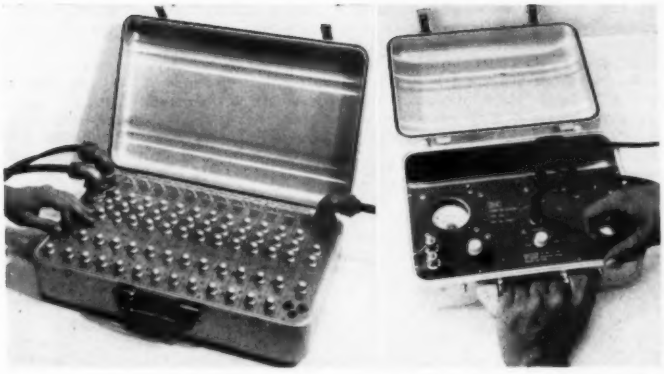
miles east of Peace River town. Under Jack Walker, Farney's crew conducted summer operations by transporting the instruments on pack horses. Shot holes were drilled with hand augers. Later, the instruments were mounted on a tracked trailer. After many months of both summer and winter operations with the P-11 seismograph, H. L. Farney commented, "All in all, we feel that we have gained considerably in portability, and have not sacrificed any quality in so doing."

Other works. — Northwest Seismic Surveys, Ltd., began work with its first P-11 unit in the muskeg of the Peace River area last August. Bob MacIntosh kept this crew moving summer and winter by transporting the instruments on wide-tracked sleds. Two of Northwest Seismic's crews, along the Farney Exploration Co. and major oil-company crews are operating so far north that their only communication is by air.

In November, Frontier Exploration Co., Ltd., started operating a P-11 seismograph in the Camrose and Stettler areas of Alberta. The Canadian "road ban" law prohibits the use of heavy trucks from the first spring thaw until roads dry out. J. L. McDonald and his crew have been transporting their complete shooting and recording equipment in a panel truck which weighs less than the road-ban limit. Ted Rosza, of Frontier Exploration Co., feels that the P-11 seismograph is ideally suited to the wide variety of terrain and weather conditions encountered in his company's operations.

Velocity Surveys, which is now operating two sets of S.I.E. P-11 seismograph equipment, also transport all of its instruments in lightweight panel trucks. Under Jack Lockwood, one unit was put to work in Canada last fall. Since December, George Jason has been conducting seismic operations with the second set in the Camrose area.

Since November of last year, Hugh Downey of Weiss Geophysical Co., has been conducting operations with a set of S.I.E. P-11 instruments mounted in a converted ½-ton panel truck. The Stony Plain-Acheson, Camrose, and High River areas in which they have been working vary from dense brush to frozen plains, and winter temperatures range from 30°



***AMPLIFIER UNIT.**—(Left) The 12-trace PSU-11 amplifier unit contains 12 GA-11 amplifiers, plus all necessary manual and automatic control circuits. The entire unit is contained in a waterproof aluminum carrying case which measures 6 by 13 by 21 in. and weighs 40 lb. **BLASTER.**—(Right) The PCB-11 incorporates the detonator, cap testing circuit, and shooter's communication in one compact unit. It measures 5 by 9 by 12 in. and weighs approximately 8 lb.*

below zero to 60° below zero.

One major oil company, whose crew has been using a P-11 unit for refraction shooting, has been operating in Canada since last fall. Instruments are transported around the frozen territories in a jeep station wagon. Another major oil company has found the combined portability and good record results of its first P-11 so valuable that it has ordered its second set of this equipment for work in the northern territories.

Hoard Exploration Co. operated a P-11 seismograph from late November until recently in West Texas. Hoard Exploration now has its P-11 in the Gulf Coast area of Louisiana.

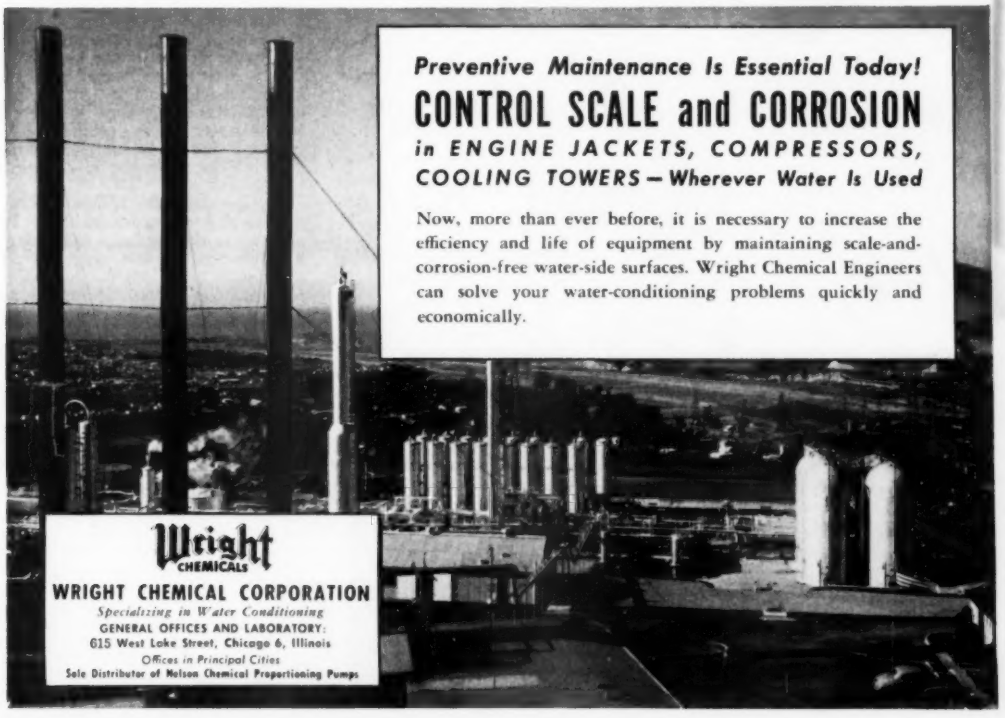
Vapor-Recovery Systems

(Continued from page 99)

Tank & Construction Co., specializing in the installation of recovery equipment, carries drainage one step further. This company uses crosses and tees for making lateral connections to the balance line. These items are fabricated so that the bottom of the lateral connection is ½ in. lower than the body. Thus any liquids condensing in the balance line drop into the laterals and do not restrict the flow of vapors.

Size of pressure and vacuum relief vents must be sufficient if damage to tankage is to be insured against. They should have sufficient capacity to exhaust the incoming dry gas in case the repressuring regulator sticks open, and to admit air to vent the suction line in case the wet-gas regulator sticks open. With the hatches set to pop open in the event a trap valve sticks and throws the entire gas load on the battery, there is but little danger of a tank being ruptured.

To hold the weight of header and lateral lines to a minimum, as well as to reduce installation costs, lightweight or "thin skin" pipe has been widely accepted. Because of this pipe's lightweight, structural angle braces which extend up from the walkway or tanks usually are sufficient as supports even in systems using 8 and 12-in. lines. Use of this thin-skin pipe


Preventive Maintenance Is Essential Today!
CONTROL SCALE and CORROSION
in ENGINE JACKETS, COMPRESSORS,
COOLING TOWERS — Wherever Water Is Used
Now, more than ever before, it is necessary to increase the efficiency and life of equipment by maintaining scale-and-corrosion-free water-side surfaces. Wright Chemical Engineers can solve your water-conditioning problems quickly and economically.
Wright
CHEMICALS
WRIGHT CHEMICAL CORPORATION
Specializing in Water Conditioning
GENERAL OFFICES AND LABORATORY:
615 West Lake Street, Chicago 6, Illinois
Offices in Principal Cities
Sole Distributor of Nelson Chemical Proportioning Pumps

in flanged, shop-fabricated sections has been found materially to reduce installation costs.

Operating Considerations

Key equipment in these operations are the vapor-recovery regulators. Keeping in mind that these regulators must respond instantly to pressure and vacuum variations in the order of 0.2 in. of water, and within the range of atmospheric pressure to around 2 in. of water, it is readily apparent that sensitivity and reliability are of prime importance.

While only one regulator (on the vacuum line) is necessary to effect vapor recovery, in many cases the operator considers the benefits of excluding all air sufficiently worth while to install a second one. Placed in the dry-gas line it operates to repressure the tanks with gas whenever sufficient crude is being shipped to result in producing a vacuum.

By so doing, air is excluded from the system at all times, unless some mishap causes the vacuum relief vent to function. The effect of this reduction in the tanks' air content is primarily to reduce fire hazards. It also results in reduced corrosion, often a serious factor in the tanks, vapor-collecting system, and field gathering lines.

The pressures and vacuums which control operation of the regulators generally are transmitted to the regulators through a 2-in. control line. The point of control usually is upstream about 15 or 25 ft. from the regulators, often near the point at which the vapor takeoff line is connected to the balance line. By placing the control point some distance from the regulators, smoother and less-frequent operation of the regulators is effected; i.e., there is less tendency for the regulator to open and then quickly close.

The pressure regulator often is set to begin opening the valve in the vacuum line when a pressure buildup of about 0.2 in. has occurred. Section then starts pulling the wet vapors from the system. If the pressure increases the regulator continues to open, becoming fully open at about 0.5 in. When sufficient vapors have been pulled from the system to drop the pressure to the regulator setting, the valve is closed. In many installations check valves are placed in the wet-gas line downstream from the regulator to prevent pressures in the gathering system from backing up into the tanks.

When shipping activity (or for any other reason) results in the pressure being reduced below the point at which the repressuring or vacuum regulator is set to function, dry gas is admitted into the system. This point generally is at atmospheric or 0.1-in. vacuum or pressure. When static conditions exist in the system both regulators are closed. Through use of a 0.1-in. or so difference in pressure between the closing of the wet-gas regulator and the opening of the dry-gas regulator, both are never open at the same time.

Dry gas generally is obtained from the nearby low-pressure field line and run to the regulator and balance line through 2 or 3-in. pipe. Between the supply point and the regulator a sediment trap is used to remove any foreign material. Likewise an auxiliary regulator often is required to reduce the pressure of the dry gas to 25 psi. or less. This step is more or less an added precaution for the protection of the tanks.

Where field vacuum lines do not exist, small electric-motor or gas-engine-driven compressors supply vacuum for removing the vapors, compressing them to sufficient pressure that they will enter the low-pressure gas-gathering line. These are either air or liquid cooled, single or double-cylinder, and generally are single stage. Where discharge pressures require it, however, two-stage equipment is employed. They range in horsepower input from about 5 to 25 hp. or higher.

These small, relatively cheap compressors, which operate continuously

WORKING PRESSURE TO 10,000 LBS.
is no problem
O-C-T "PC" CHOKES WERE DESIGNED SPECIFICALLY TO GET THE JOB DONE AT EXTREME PRESSURES

FOR SALE

To an individual for his own use.
To a business for its employees.
To a club or school.
To a resort owner.

ONE OF THE FINEST IN THE ROCKIES

This beautiful country estate, a delightful French Provincial house, was planned for convenience, distinguished atmosphere and for perfect harmony with the pines and spruce, in the most spectacular setting in the Rocky Mountains. Magnificent view of snow-capped Mt. Evans and many other peaks. This house was built by one of Colorado's wealthiest families and no expense was spared in the superior construction and appointments. It has dignity, charm and structurally will stand the most rigid inspection. It is what you would call a large, small house, 6 rooms, 3 baths, fascinating interior details too numerous to mention.

In excellent condition, leaded casement windows, asbestos slate roof, quick vapor heat, automatic oil burner, all interior hardware and light fixtures especially designed.

A most livable patio, 33x35 feet, a large portion roofed over, flagstone floors, many beautiful hand carved stone pillars, large pine tree in center.

A large rumpus room with maple floor for dancing, piano, bar, billiard table, and ping-pong table. An ideal game room.

Breathtaking views in all directions. Five attractive guest cottages, 4 rooms each, completely furnished.

Approximately 400 acres, located 30 miles west of Denver, 4 miles west of Evergreen. Paved State Highway No. 98 runs approximately thru the middle of ranch. Bear Creek also runs approximately thru the middle of ranch. It is an all year 'round stream 15 to 20 feet wide, good clear water, has Rainbow, Native and German brown trout. Many deer and elk roam the hills. The ranch is closed territory, open hunting season only a few miles up the canyon. There is a beautiful valley with about 30 acres of hay meadow.

FOR INSPECTION AND COMPLETE INFORMATION PHONE OWNER. E. C. STANFIELD, EVERGREEN 51, EVERGREEN, COLO.

Owner will retain any of the guest cottages or land the purchaser does not desire and reduce price accordingly.

Building Strength for the Free World

*Highlights from the Annual Report of Standard Oil Company (New Jersey)**

for 1950... a year of record activity

Standard Oil Company (New Jersey) is an American corporation which has, in varying degrees, investments of capital and technical knowledge in a large number of operating oil companies, both in the United States and abroad. In 1950, these companies:

IN THE U. S. A.

Drilled over a thousand new wells, with an unusually high proportion of producers . . . Improved and expanded refineries in New Jersey, Maryland, Louisiana, and Texas . . . Completed a new continuous wax-making plant at Bayonne, N. J. . . . Added 370 miles to Texas crude oil pipeline systems . . . Started doubling the capacity of a products pipeline across Pennsylvania . . . Let contracts to increase by 85% the capacity of a pipeline from Baton Rouge to the Southeastern states . . . At government request, re-activated two government-owned Butyl rubber plants; also continued operating two others which have been producing constantly since 1943 . . . Invested over 20 million dollars in laboratory research for new and improved processes and products.

IN WESTERN EUROPE

Proposed a plan which ended gasoline rationing in England . . . Went ahead of schedule in construction of a new refinery at Fawley, England, to be the largest in Europe . . . Expanded, improved or started construction of refineries in Norway, Belgium, West Germany, France, and Italy . . . Opened many new service stations, which served not only local motorists, but some 18,000 American tourists . . . Supplied 28% more fuel oil than a year ago, to meet needs for industrial expansion . . . Met the greatest demand for asphalt for new road building ever experienced in these areas.

IN THE MIDDLE EAST

Stepped up oil production substantially in Saudi Arabia . . . Opened the vitally important Trans-Arabian Pipeline system from oil fields on the Persian Gulf to the Mediterranean . . . over 1,000 miles of 30- and 31-inch pipe . . . Started construction of a large-diameter pipeline extending 550 miles from Iraq to the Mediterranean.

IN THE FAR EAST

Expanded production of crude oil in Indonesia and explored for oil in Papua . . . Increased output of refineries in Australia, Sumatra, Japan.

IN CANADA

Produced nearly 50% more oil than a year ago . . . Made new oil and gas discoveries in Ontario and Alberta . . . Operated nine refineries at 14% greater output than a year ago . . . Opened a new 1,100-mile pipeline system from Alberta to Lake Superior, to carry crude oil toward the major Canadian refineries and markets.

IN SOUTH AMERICA

Set a new production record in Venezuela, second largest oil-producing country in the world . . . Operated the big Aruba refinery in the Netherlands West Indies at a higher rate than ever before . . . Met sharply increased call for products throughout the continent, to support the vigorous post-war development.

IN OCEAN TRANSPORT

Received the last 4 of 12 super-tankers ordered two years ago . . . Ordered 6 more new tankers . . . Operated an ocean-going tanker fleet of 117 vessels, totaling over 2 million deadweight tons.

IN EMPLOYEE RELATIONS

Continued the same favorable labor relationships that have prevailed for more than three decades, with no strikes in domestic operations.

THE YEAR ENDED . . . THE JOB GOES ON. In 1950, for the first time, world use of oil outside the Iron Curtain passed 10 million barrels a day. For comparison, it was just over 7 million in 1945, the peak war year.

This is significant to free people everywhere. Oil supplies in today's world are closely linked to living standards and national strength.

It seems clear that more and more the world will look to oil to help keep it free and progressive. More and more it becomes clear, in meeting that need, that the American-developed business process of risk and result . . . of competition spurring corporate ingenuity and responsibility . . . is a strong and flexible system for promoting the welfare of people.

* We will be pleased to send a copy of the full report to anyone wishing it. Write Room 1626, 30 Rockefeller Plaza, New York 20, N. Y.

FINANCIAL SUMMARY

Standard Oil Company (New Jersey) and Consolidated Affiliates

Total income from sales, services, dividends and interest . . $3,198,266,000	Taxes collected for governments . . $294,749,000
Net income . . . $408,223,000 or $13.48 per share	Wages and other employment costs . . $548,205,000
Dividends . . . $151,028,000 or $5.00 per share	Spent for new plants and facilities . . . $295,132,000
Taxes paid . . . $276,000,000	Number of stockholder-owners 222,000
	Number of employees 116,000

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES

day in and day out, have permitted the installation of many systems which otherwise would not have been possible. Because of the necessity for running a line considerable distances to a field vacuum line, often a satisfactory payout could not be shown where only a small amount of vapors was involved. The availability of these small compressors made it economical to do so.

This is particularly true of the smaller (5 to 15-hp.) air-cooled units. These are similar to the V-type compressors used for air service except that the cylinders are horizontal to eliminate lubrication difficulties caused by condensation in the cylinders. While not as trouble free as the horizontal, liquid-cooled compressors these units are giving satisfactory service in many California fields.

Where larger volumes of vapors are being handled, horizontal, single-cylinder units belt-driven by electric motors generally are preferred. For cooling the jacket water most installations employ used oil drums as a reservoir with circulation being obtained through a thermosyphon hookup. Or small centrifugal pumps are used with cooling being effected in a conventional fan-cooled radiator. Where freezing temperatures are encountered, absorption oil sometimes is used as the cooling medium.

In connection with these horizontal, single-cylinder units a recent development is the use of unloading valves on the compressor cylinder. These unloaders are automatically actuated by the vacuum existing in the intake line. Thus during times when only a small volume of vapors is available, the unloaders function to eliminate the pulling of a heavy vacuum on the regulator. Richfield has adopted their use at its South Cuyama installations.

To prevent any liquid which may condense in the intake line from being pulled into the compressor cylinder, scrubbers are placed just ahead of the unit. While they are equipped with a bleed at the bottom so that any accumulated liquids can be drained as often as needed, mercury high-level switches are provided as a safety precaution. Likewise to prevent overheating of the compressor, mercury switches are used to shut down the motor when jack-water temperatures become too high.

BOOKS

RESUME ROCKY MOUNTAIN OIL AND GAS OPERATIONS FOR 1950. Published by Petroleum Information, Continental Oil Co., Denver. 105 pp. $10.

This volume comprises the twenty-first annual summary of information on leasing, drilling, production, geophysical, and other operations in the Rocky Mountain states. The book is featured by a series of electrical logs of discovery wells, tabulation of geophysical activities by states and by companies, individual well-completion details for the year, and tabulations of the annual crude-oil production for each field. The descriptive sections on the Julesburg basin and the Big Horn basin deserve special commendation.

WHERE YOUR CORROSION RESISTANT PIPING PROBLEMS ALWAYS FIND THE RIGHT ANSWER

TRI-CLOVER offers over 30 years of specialized experience in solving corrosion-resistant piping problems for Industry. Skilled craftsmen and engineers in four completely equipped plants have made the name *Tri-Clover* on stainless steel and alloy fittings, valves, pumps, and specialties signify unexcelled performance.

Your selection of the *right* fitting, tubing or pipe for the *right* job is made easier by Tri-Clover's complete production and engineering facilities. Benefit from this fact. For here is one dependable source . . . one responsibility for your piping problem.

Remember to specify Tri-Clover!

EXPORT DIVISION — 8 So. Michigan, Chicago 3, U. S. A.

Tri-Clover®
MACHINE CO.
Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

The Value of Agents for the

Control of Silicate Swelling in Acidizing

Advantages claimed are greater production increase, smaller amount of emulsion, shorter period of time for the oil to become of pipe-line quality, and an easier return of the spent acid from the formation.

by P. H. Cardwell

IT long has been recognized that certain materials found in the various limestone and dolomite formations are insoluble in hydrochloric acid solutions. But it has been only recently that these acid-insoluble materials, quartz, anhydrite, and numerous silicates of various types, have been given consideration in the planning of acidizing treatments.

The reason for considering the acid-insoluble materials is that there is a possibility of such materials reducing the benefits which should be derived from the acidizing process. The insoluble materials seldom will reduce the permeability of an acidized section to that which it was previous to acidizing, but they can reduce the permeability from a small amount to sufficient to counteract completely the value of the acid treatment.

One of the first methods to take into consideration the insoluble materials was that of the use of 7.5 per cent hydrochloric acid solutions instead of 15 per cent solutions for acidizing limestone and dolomite formations. The idea behind the use of the weaker concentration of acid was that there would be a smaller amount of insoluble material in the spent-acid solution, thus a more effective removal of these materials from the well should be obtained. This seems logical because spent solutions from 7.5 per cent acid will contain only half of the quantity of insolubles contained by those of 15 per cent acid. Probably this is one of the reasons why such an acid solution has been more effective than 15 per cent acid in the acidizing of certain oil and gas formations.

To obtain the maximum benefits from acidizing, it is important that any reduction in permeability of the formation by insoluble materials be kept to a minimum. Of these materials the insoluble silicates are extremely harmful. However, the swelling of silicates can be controlled through the use of chemical agents, a recent development. This paper is concerned with the properties of acid solutions containing such agents, the value of these agents in acidizing, and the results obtained through their use in acidizing various formations.

Acid Insoluble Materials

Chemical composition of limestone and dolomite formations varies considerably from one locality to another; in fact, marked changes in composition often are found at different depths within the same formation. In Table 1 are given the chemical analyses of various oil-bearing formations as determined by X-ray diffraction. The materials included in this table which are insoluble in hydrochloric acid solutions are: (1) The X-ray unidentifiable amorphous silicates, (2) illite, (3) feldspar type minerals, (4) anhydrite, and (5) alpha quartz. The major constituents of the amorphous silicates are the clay minerals which may be classified into the three groups: (1) montmorillonite-beidellite, (2) kaolin, and (3) illite.

The clay materials are important

THE AUTHOR

Paul H. Cardwell, chief chemist for Dowell Incorporated, Tulsa, received his A.B. degree from Central Michigan Teachers College in 1935 and his Ph.D. degree in colloid chemistry from University of Michigan in 1941. He joined Dowell in 1941.

This paper was presented at the Mid-Continent District, A.P.I. Division of Production in Amarillo, March 21-23.

TABLE 1—CHEMICAL COMPOSITION OF VARIOUS FORMATIONS

Formation and depth—	Feet	Pool and location	Weight per cent: Dolomite	Limestone	Amorphous silicates unidentifiable	Illite	Feldspar type minerals	Alpha quartz	Anhydrite
Arbuckle	3,447	West Boyd, Kansas	60		10		10	20	
Brown dolomite	3,146	West Pampa, Texas	55				5		40
Brown dolomite	3,299	West Pampa, Texas	80				10	5	5
Caddo	3,868	Daly Caddo, Texas		90			5	5	
Caddo	3,883	Daly Caddo, Texas		90	5				5
Caddo	3,922	Daly Caddo, Texas	15	65		10		10	
Clear Fork	5,555	Goldsmith, Texas	70		10			10	10
Clear Fork	5,680	Goldsmith, Texas	80		5			10	5
Clear Fork	5,815	Smyer, Texas	75						25
Clear Fork	5,920	Smyer, Texas	80					5	15
Clear Fork	7,200	Flanagan, Texas	80		5			5	10
Fort Riley—Upper	2,555	Hugoton, Texas		80		10		5	5
Grayburg	1,750	Shannon Ridge, Texas	60					35	5
Grayburg	3,610	C-Bar, Texas	60	20		10		5	5
Herrington	3,063	Hugoton, Texas		80	5		10	5	
Krider—Lower	3,253	Hugoton, Texas	80				5	10	5
Krider—Upper	3,123	Hugoton, Texas		90	5		5		
Panhandle dolomite	2,540	Panhandle-White Deer, Texas	30		10				60
Panhandle dolomite	2,640	Panhandle-White Deer, Texas	50		15			35	
Panhandle dolomite	2,680	Panhandle-White Deer, Texas	70		10			20	
Panhandle dolomite	2,900	Panhandle-Borger, Texas	45					20	35
Panhandle dolomite	2,935	Panhandle-Borger, Texas	75						25
Panhandle dolomite	3,078	Panhandle-Watkins, Texas	75					5	20
San Andres	4,750	Levelland, Texas	30					10	60
San Andres	4,850	Levelland, Texas	80		15			5	
Winfield	3,313	Hugoton, Texas	80				5	10	5

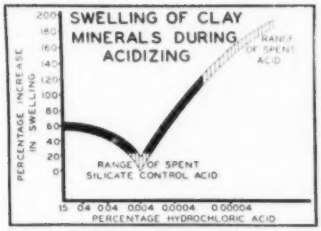

SWELLING OF CLAY MINERALS DURING ACIDIZING
PERCENTAGE INCREASE IN SWELLING
RANGE OF SPENT ACID
RANGE OF SPENT SILICATE CONTROL ACID
PERCENTAGE HYDROCHLORIC ACID

Fig. 1

from the standpoint of acidizing in that they possess the property of being able to change their swelling characteristics in accordance with any change in their environment and, a change in environment is brough about by acidizing. The effect of thi new environment can change th swelling of the clay particles by one or all of the following methods: (1) By increasing the amount of water adsorbed, (2) by means of base exchange, and (3) by a change in pH of the clay.

Acidizing Changes Clay Environment

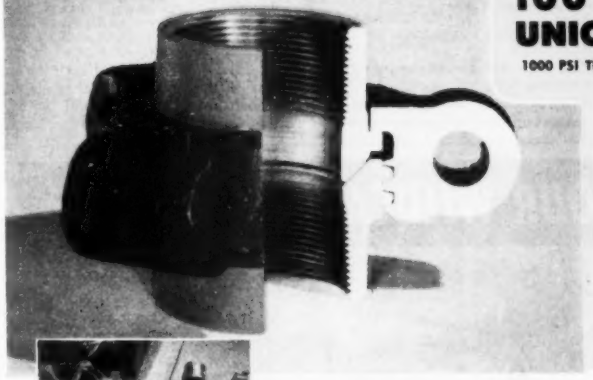
Location of clays.—The various clays are found in one of two places in oil-bearing formations. The clay particles may be completely enclosed by the limestone or dolomite as an integral part of the formation and in such a state are not exposed to the fluids of the well. They also may be present in fractures and in the flow channels, in which places they are exposed to the well fluids. These clays either may be a part of the formation or may have infiltered into the formation. This latter state is accomplished by the clays being carried along with the brine and the oil or deposited from drilling mud.

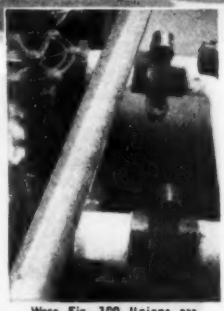
Adsorption of water.—The formation-enclosed clay particles will become exposed to water during acidizing of a well when the acid dissolves away the limestone and dolomite which surrounds them. The amount that such particles will swell depends upon the quantity and type of water previously adsorbed by the particles, during the geological formation of the oil-bearing section. Those particles which already have adsorbed their maximum amount of water will not take up any more, thus will not increase in volume when contacted by acid. The particle which do not contain their maximum amount of water will adsorb an additional amount on contact by acid, resulting in an increase in their volume.

These enclosed clay particles can take up water in three manners, namely as crystal water, broken-bond water, and planar water. Crystal water is that which is an integral part of the structural unit of the clay This water is very firmly held and can be driven off only at temperatures of 550° to 600° C. for the kaolins; 500° to 650° C. for the illites; and

EXACTLY RIGHT FOR THE JOB!

WECO FIG. 100 UNION
1000 PSI TEST





Weco Fig. 100 Unions are exactly right for connecting steel mud tanks.

Fig. 100 Unions are exactly right for fuel line connections.

Exactly right for simplifying valve installation maintenance.

MEANS 100% EFFICIENCY in Make-up, Service, Economy

Designed for 1000 lb. test pressures, Weco Fig. 100 Unions are exactly right for separator and tank connections, fuel and water lines, manifolds, headers and other connections on lines with working pressures of approximately 500 lbs.

The ball and cone seat makes a positive, leak-proof seal. Fig. 100 Unions are made of tough and durable malleable iron . . . withstand repeated use in hard service. You can make them up fast with a hammer blow on the bar nut lugs, or with a bar through the holes in the nut.

For longest service and greatest economy on low pressure line connections use the Union that is exactly right for the job . . . WECO FIG. 100 UNION. Available in sizes 2" through 8".

WELL EQUIPMENT MFG. CORP.
Subsidiary of Chiksan Company
HOUSTON 1, TEXAS
Exclusive Sales Representative Outside Mid-Continent Area
CHIKSAN COMPANY
Brea, Calif. Chicago 3, Ill. Newark 2, N. J.
Export Sales: CHIKSAN EXPORT COMPANY Brea, Calif. Newark 2, N. J.

WECO
Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

TABLE 2—REDUCTION OF SWELLING OF CLAYS BY USE OF SILICATE CONTROL AGENTS
(Weight per cent)

Formation, pool and location—	Illite	Bentonite	Amorphous silicates	Feldspar type minerals	Quartz	Anhydrite	Per cent*
		100					57
	100						69
Arbuckle—Workman, Kansas	15			10	75		54
Ft. Riley, Upper—Hugoton, Kansas	40			10	35	15	48
Grayburg—C-Bar, Texas	50				35	15	70
Herrington—Hugoton, Kansas			30	30	40		50
Winfield, Hugoton, Kansas			40		60		79
San Andres, Levelland, Texas			75		25		53

*Reduction from use of silicate control agent.

600° to 700° C. for the montmorillonite-beidellites.

Broken-bond water is that which becomes adsorbed at the corners and broken edges of the clay particles in order to satisfy electrical charges in these positions. While crystal water is held far more tenaciously than broken-bond water, in some cases it may require temperatures as high as 300° C. to drive off the broken-bond type. Most of the adsorbed water of the illites is believed to be broken-bond water.

Planar water is that which is adsorbed on the surface of the structural clay units and as a result pries the crystals apart. This type of water accounts to a large degree for the considerable amount of swelling exhibited by various clay materials. Individual structural sheets of the montmorillonite-beidellites are pried apart by planar water much more readily than in the case of illites or the kaolins and therefore swell to a greater degree.

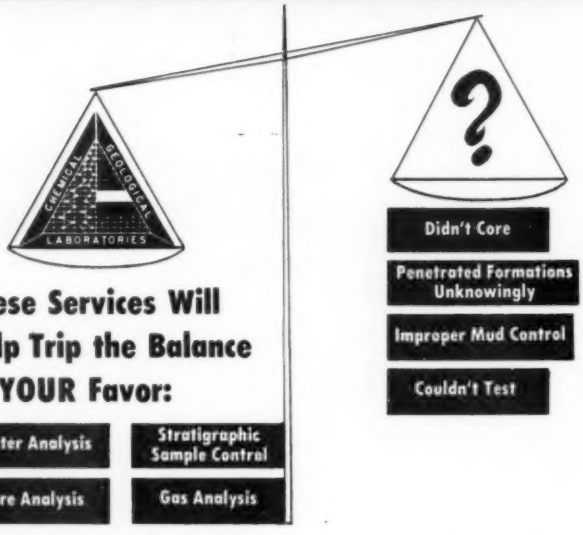
There is considerable laboratory evidence of the adsorption of water from acid solution by the formation-enclosed clay particles. Laboratory tests on oil-bearing limestone and dolomite formations occasionally show cores into which water can be forced with seemingly little change in permeability of the cores. However, once the acid contacts these same cores the permeability is reduced very materially. When this happens the cores usually contain the clay materials indicating that once the acid removes the limestone and dolomite exposing the enclosed clay particles swelling takes place which in turn decreases the permeability of the cores.

The clay particles which are within the fractures and flow channels of the formation are in contact with the interstitial water. It would be expected then that these particles already will have adsorbed approximately their maximum amount of water. Actually these clay particles may absorb additional small quantities of water, especially if they have not taken up their requirements from the interstitial water. In any case, however, the amount of swelling from adsorption of water by these clays upon contact with acid will be very small.

Base exchange.—The swelling characteristics of clays also depend upon their base-exchange properties[2,3,4,5] in addition to the type and amount of water adsorbed. Clays can adsorb certain metallic cations such as sodium, potassium, calcium, magnesium, and hydrogen from water solutions. In the clays there is a greater attraction for some cations than for others with the result that, under certain conditions, a cation of lesser attraction which already is adsorbed upon the clay particle may be discarded in favor of a cation which is present in the surrounding solution media.[1] This particular property is base exchange, whereby there is a cation-for-cation exchange between a surrounding solution which carries the cation and the clay-particle adsorbed cation.[6]

When acid contacts a clay particle there will be a base-exchange occurrence in which the hydrogen cation of the acid will exchange for the metallic cation attached to the clay.

YOUR WILDCAT IS A GAMBLE



These Services Will Help Trip the Balance in YOUR Favor:

Water Analysis | Stratigraphic Sample Control
Core Analysis | Gas Analysis

From the time a wildcat is spudded it is a gamble. You can help trip the balance in your favor if you take advantage of the complete technical assistance offered by Chemical & Geological Laboratories.

COMPLETE, ACCURATE INFORMATION

These services include geological and geophysical facts before drilling and ALL phases of analysis as drilling progresses. Thus, you get complete, accurate information... and, eliminate costly studies for income tax purposes, bank loans and property evaluation.

WRITE FOR BROCHURE

CHEMICAL & GEOLOGICAL LABORATORIES
P.O. Box 379
CASPER, WYOMING

CHEMICAL & GEOLOGICAL LABORATORIES, LTD.
P.O. Box 157
EDMONTON, ALBERTA, CANADA

The metallic cations present on the clay particle usually will be those of sodium, potassium, calcium, and magnesium. The amount of each of these various metallic cations attached to the clay particles depends upon the environment to which the clay was exposed just prior to being contacted by the acid. If that environment happened to have been brine, then the cations attached to the clay will be those present in the brine. Likewise, the clay particles enclosed within the limestone and dolomite crystals will have cations which were present in the water during the deposition of the formation.

Since there is greater attraction between the hydrogen cations of the acid solution and the clay particles than between the clay particles and any of the normally adsorbed metallic cations, base exchange will take place forming hydrogen clays. This conversion to hydrogen clays will bring about a flocculation or a decrease in volume of the clay particles.

Effect of pH change and neutralization of acid.—During the acidizing of a formation the clay particles encounter still another change in environment which is that brought about by neutralization of the acid. In this environment there are two things taking place concurrently. These are the changing pH of the acid solution and the effect of base exchange of the clay in which calcium and magnesium are replacing the hydrogen adsorbed on the clays. The effect of changing pH is to reduce the volume of the clay slightly until a pH of 2.5 to 3.5 is reached. This is the point of minimum swelling and is also the isoelectric point of the clay. Further spending of the acid to that of spent acid of pH 5.0 to 5.5 will, as far as pH is concerned, bring about an increase in swelling of the clay.

During this change in acid concentration there is taking place either base exchange in which the calcium obtained by the acid reacting on limestone is replacing the hydrogen adsorbed by the clay or base exchange in which calcium and magnesium obtained by the acid reacting on dolomite are replacing the hydrogen adsorbed by the clay. The effect of this is to form a calcium or magnesium clay, either of which causes a reswelling of the clay particles.

The combination of the two factors, the effect of pH change and of base exchange, taking place simultaneously is to bring about a point at which the clay particle will be at its state of minimum swelling during the conversion of the hydrogen clay over to a calcium or magnesium clay. This point varies slightly with the different clays.

The effect of both pH and base exchange is illustrated by the graph in Fig. 1. The clay material from which these results were obtained was composed of 60 per cent silicates (montmorillonite-beidellite type), 20 per cent pyrite and 20 per cent quartz.

TABLE 3—RESULTS OF SILICATE CONTROL ACID TREATMENTS

Formation, pool and location—	Production (bbl. oil per day) Before	After (potential)	Amount acid used (gal.)
Clear Folk, Upper—Goldsmith 5600, Texas	33	340	10,000
Clear Fork, Upper—Goldsmith 5600, Texas		615	2,000
Clear Fork, Upper—Goldsmith 5600, Texas		168	2,000
Devonian—Dollarhide, Texas	72	384	1,000
Grayburg—Howard Phillips, Texas	8	125	2,000
Grayburg—North Iatan, Texas	show	35	3,000
Grayburg—North Iatan, Texas	2	40	3,000
San Andres—Howard-Glasscock, Texas	65	300	2,000
San Andres—Levelland, Texas		528	1,000
San Andres—Wildcat, Texas	show	205	1,000
Seven Rivers—Pimera, New Mexico	2	7	500

Change in volume of clay particles during acidizing.—At this point it is of interest to compare the relative volume of the clay particles in the various environments which are brought about by acidizing of a formation. The clay particles as they

Like a police dog

it watches and protects your engines

Oil pressure failure or overheated cooling water can happen anytime ... and it can happen to the best engine! But serious damage and costly repairs resulting from such minor troubles *can be prevented* with a PENN Safety Control.

Here's how it works. If water temperature rises beyond the predetermined safe point ... or if oil pressure falls too low ... the PENN Control goes into action! It automatically sounds an alarm, flashes a warning light or stops the engine operation ... whichever you choose. Then, the minor fault can be investigated and corrected before major damage occurs.

Simple to install on new or old engines, PENN Safety Controls are available in three basic models (1) oil pressure only (2) water temperature only (3) combination pressure and temperature. Learn more about this *low-cost protection,* send for Bulletin E-100. Write **Penn Electric Switch Co., Goshen, Indiana.** Export Division: 13 E. 40th St., New York 16, U. S. A. In Canada: Penn Controls, Ltd., Toronto, Ont.

PENN

AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, PUMPS, AIR COMPRESSORS, ENGINES, GAS RANGES

PLENTY OF *Working Space* IS A FEATURE OF LEE C. MOORE MASTS

Pictured here is the bottom portion of a Lee C. Moore 133 foot Cantilever Mast. This picture illustrates the very generous floor space which is a feature of each Lee C. Moore Mast.

The rear legs of the mast are hinged to allow clearance for the largest drawworks.

LEE C. MOORE CORPORATION

TULSA • DALLAS • HOUSTON • MIDLAND • SHREVEPORT • WICHITA • CENTRALIA • PITTSBURGH

Export Office — 9 Rockefeller Plaza, New York 20, N. Y.

are found in place occupy a certain volume. If these same clay particles adsorb crystal, broken-bond, or planar water from the acid solution, they will swell, increasing the volume. The conversion of the clay to the hydrogen clay will flocculate the particles, thus decreasing the volume. The net effect of this action will be that the volume of the hydrogen clay will be greater than the original volume of the clay in those cases in which the clays have adsorbed appreciable quantities of water. In the instance of those clays which have adsorbed no water or only small amounts upon contact with acid, the volume of the hydrogen clay will be smaller than the original volume of the clay.

As the hydrogen clays are converted to calcium or magnesium clays by neutralization of the acid, the volume of the clay particles at first will decrease slightly and then increase very materially in volume. The final volume of the calcium and magnesium clays at the conclusion of the acidizing treatment will be greater than the original volume of the clays in those cases in which the clays have adsorbed appreciable quantities of water, i.e., the clay particles that originally were completely enclosed by the limestone or dolomite crystals.

Those clays which have not adsorbed water, or only very little, during the acidizing may occupy a smaller, or about the same, volume after acidizing, depending upon the nature of the original clay. If the original was a sodium clay, then the clay obtained after acidizing will be considerably smaller in volume. If the original was a calcium clay, then the final clay will have about the same volume, or possibly slightly smaller. Thus, the clay particles deposited from drilling mud will decrease in volume as a result of acidizing. Those particles which originally were a part of the formation and which were in the flow channels in contact with interstitial water will change in volume very little during acidizing.

Silicate-Swelling Control Agents

Since the clay minerals can cause reduction in the permeability of an acidized section, it is advisable to minimize this effect as much as possible. One method of accomplishing this end is to use silicate-swelling control agents in the acid solution. These materials will maintain the environment surrounding the clay particles in such a manner that the particles will be kept in a state of minimum swelling while being converted from a hydrogen to a calcium clay during the acidizing process. The value of an agent of this type is revealed by the data in Table 2.

The results given in this table were obtained by subjecting an excess of various formations to 15 per cent hydrochloric acid solutions and then measuring the volume of the swollen clay minerals. Following this, the tests were repeated with a silicate swelling control agent present in the acid solution. Care was taken to insure that the same amount of acid-insoluble materials was present in each corresponding case. The data are reported as the percentage reduction in volume of the swollen-clay minerals brought about by the use of the silicate-swelling control agent.

The value of silicate-swelling control agents in acidizing is three-fold; namely, in the reduction of emulsion or b.s. and w. content of the produced oil, in the increase in permeability of the formation, and in the ease of spent acid return from the formation.

The reduction of emulsions is based upon the fact that clays are excellent emulsifying agents for oil-in-water systems. This type of emulsion is not the normal type experienced in breaking out crude oil-brine emulsions where the emulsion usually is of the water-in-oil type. Oil-in-water emulsions with clay-emulsifying agents often are obtained following the acidizing of limestone and dolomite formations. Since the clay minerals in this instance exist as a film around the droplets of emulsified oil, the greater the surface area of the clays the greater will be the amount of emulsion formed, Whenever the volume of the clays is decreased, the surface area will be reduced, which will likewise decrease the amount of emulsion. It is for this reason that the amount of emulsion will be reduced when silicate-swelling control agents are present in the acid solution.

Laboratory tests as well as field experience have shown that by decreasing the volume of the clay minerals 66 per cent the amount of emulsion can be decreased by as much as 80 per cent. The effect of this reduction in emulsion has brought about the situation where the wells following acid treatment have cleaned up to pipe-line oil in 2 to 3 hours of swabbing, whereas the normal swabbing time has been 24 to 36 hours.

Another value of a silicate-swelling control agent is the reduction in volume of the clay materials which in turn will increase the permeability of the formation. This has enabled acidizing to be used in certain fields in which conventional acid treatments have been unsuccessful. The increase in permeability of the formation allows for easier and more complete return of the spent acid to the well bore. The reduction of emulsion also helps materially in the return of the spent acid. The results of treatments using silicate-swelling control agents are given in Table 3.

Silicate-Control Acid Treatments

Case A.—The first well tabulated in Table 3 had been acidized in a manner conventional for its area with 900 gal. of acid, resulting in a potential of 240 bbl. oil daily. Following the test it became necessary to kill the well with mud in order to remove a formation packer.

When the well was put back on production it made only 33 bbl. oil daily. The reduction in oil was believed to be caused by clay materials from the drilling mud reducing the permeability of the formation. Based upon this reasoning the well was reacidized with 10,000 gal. of silicate-control acid. The result of this treatment was an increase, even over that obtained from the original acid treatment, to 340 bbl. oil daily.

Case B.—A treatment which illustrates the value of the silicate-control agent for reducing b.s. and w. content of the produced fluid is that of the second upper Clear Fork well listed in the tabulation. An offset well, comparable in all respects, was acidized with 2,000 gal. of regular hydrochloric acid. The well in which the silicate-control acid was used flowed back the oil flush and spent-acid water in 3 hours. The other well, for comparison, had to be swabbed three times following which it flowed back the flush oil and spent-acid water in a period of 4 hours. Both wells then were tested for 6 hours.

The well which had been treated with the silicate-control acid made an average of 4 per cent water during the test. It did not produce any b.s. and w. except during the fifth hour, at which time it made 4 per cent. The offset well, in which the silicate-control agent was not used, made b.s. and w. all during the test, the amount varying from 14 to 22 per cent, with an average being 17 per cent. This well produced an average of 3 per cent water. The well treated with silicate-control acid produced an average of 25.5 bbl. oil hourly, compared to an average of 23.5 bbl. oil hourly for the offset well.

Case C.—An illustration of the ease of spent-acid water return together with reduction in b.s. and w. content is that of the third upper Clear Fork well shown in the table. This well is located in a different section of the Goldsmith 5600 pool from the wells previously considered. A comparable well to this also was treated with the same amount of acid, but without the silicate-control agent.

The well treated with the silicate-control agent included in the acid flowed back the oil flush and spent-acid water in 8 hours time. The comparison well did not flow, requiring the oil flush and spent-acid water to be removed by swabbing, consuming a 10-hour period. Both wells then were tested for 6 hours.

The well in which the silicate-control acid was used flowing during the test, making 2 per cent b.s. and w. during 2 of the 6 hours. Where the silicate-control agent was not used, the well had to be swabbed once each hour. It made b.s. and w. continuously, the amount varying from 1 to 6 per cent, with an average of 3 per cent. The well which had been treated with the silicate-control acid produced slightly more oil during the test, averaging 7.0 bbl. oil hourly, as compared to 6.5 bbl. oil hourly for the other well.

Case D.—The Devonian well listed in the tabulation tested natural at 72 bbl. oil daily. Amorphous silicates were known to be present in this formation. The well cleaned up in 1.5 hours following treatment at which time the potential was started. It then flowed at the rate of 384 bbl. oil daily through a 20/64-in. choke.

Case E.—An example of the use of silicate-control acid to increase production in those areas where conventional acid has failed is that of the two Grayburg wells located in North Iatan pool. Acid-insoluble material present in the formation consisted of 40 per cent quartz, 35 per cent amorphous silicates, and 25 per cent anhydrite.

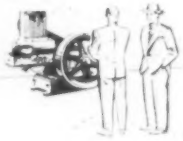
Case F.—The San Andres well located in Howard-Glasscock pool was in an area in which acidizing comparable wells had never given a potential of over 100 bbl. oil daily. Again in this case amorphous silicates were present in the formation.

Case G.—An example of a treatment in which a small amount of the silicate-control acid overcame reduction in permeability following a large gallonage acid treatment is that of the San Andres well located in Levelland pool. This well previously had been acidized with 11,000 gal. of acid

ONE DAY . . . not long ago . . . a fellow walks into our store out in Odessa and says he's been hearing about our CSCO engine, and can we talk to him about it. Well, that kinda makes me blush. Sure, I can talk about it. In fact, I've been helping operators buy the Green Beauty for six years now, and I know the job this engine's done in fields all over the world. But, I still blush a little when people ask me to talk with them about it.

▲ ▲ ▲

That's because when we first got a CSCO and I was pretty pepped up about it a fellow walks in one day and I start to talk pretty fast and pretty excitedly about it. He kinda gets a little red as I go and I can't figure out what's eating him. Finally, tho, he turns to me and says something like this: "Young man, you just keep still a minute and let me look. I got eyes and I know something about pumping engines."



Well, that stops me and I just stand around but—he keeps talking.

"I can see," he says, "this extra large opening in the crankcase makes oil changing and cleaning out easier than the engines I've been using. And you won't have to stop her to check or add oil or water." "That," says he, "is mighty convenient."

I agree but don't add very much because he still looks at me with a hard eye.

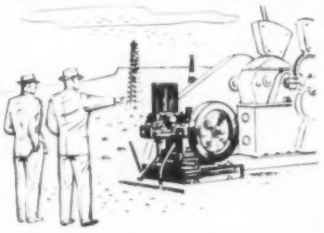
Then, before I can catch my breath, he takes off his coat, picks up a couple of tools and starts to work. He removes the six cap-screws from the top cover of the crankcase, removes the hand nut and lifts off the front cover. In short order he's removed the rod-bearing cap and pulled the piston.

He turns to me and says, "Simple." And he grunts something which sounds like "Good," and then in a little while more he's got the whole thing back together again. Thirty minutes, the whole job took!

He smiles a little and points to my hat and tells me to put it on and come with him. I still can't figure it out but he tells me to get in his car and starts to drive out of town. For a few minutes he doesn't say much and I get up my courage and ask him where we're headed.

Well, before he can answer he pulls up to a spot where I can see one of our engines pumping away.

My hat blows off at this point and I don't hear how the talk starts but by the time I'm back to the engine I hear this fellow I'm telling about say he wants to hear how the engine runs at different speeds. This operator fellow obliges and I stand by with pride spurting out of each eye as I hear the smooth, level power as she goes from slow up to full power without a blink or cough. By this time I'm pretty tired of saying nothing so I get up my courage and tell this fellow that the reason the CSCO gives steady operation is because of damping exactly suited to their extra-heavy flywheels.



I tell him, too, that the flywheel inertia provides peak power while the oil damped governor holds the throttle steady. This, I say, permits the engine to average power, up to its full capacity.

At this point, the fellow turns to me and says, still with a hard look, "I see!"

Then, he thanks the operator.

And he starts back to his car.

All the way back to town, I'm trying to start a conversation but this fellow won't say much. Finally, I blurt out that the CSCO is easy to start.

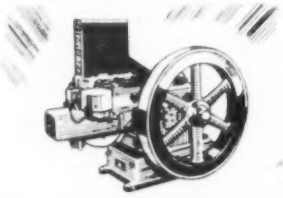
At this he smiles and, instead of saying "I see," he says, "I know."

▲ ▲ ▲

And, the next thing I know we're back at the store and he parks and as we go inside this fellow kinda drops a hand on my shoulder and says in a nice, friendly way, "She's as good as they say."

Well, before I can open my mouth to agree, he says to me that he wants two of these engines and he wants them quick.

He can't stop me there. So I tell him about Continental service and how I'll really take care of his orders and . . . but before I can go any further, he smiles a little, signs the order and says, "I know."



And with that he strides out the door and I can't believe my ears, he's whistling!

You'll whistle, and hum . . . too . . . with CSCO engines at work for you. Write for bulletin.

▲ ▲ ▲

THE CONTINENTAL SUPPLY COMPANY

SERVING THE OIL AND GAS INDUSTRIES

THE CONTINENTAL SUPPLY COMPANY
General Offices: DALLAS, TEXAS
Export Division: 30 Rockefeller Plaza, New York, N. Y.
Representatives: ARGENTINA • BOLIVIA • BRAZIL CHILE • COLOMBIA • ENGLAND • ECUADOR • PERU TRINIDAD • URUGUAY • VENEZUELA

resulting in a potential of 432 to 480 bbl. oil daily. The well declined very rapidly after this treatment. It then was reasoned that production was being restricted by clay minerals plugging the formation. Following reacidizing of the well with 1,000 gal. of silicate-control acid it made a potential of 528 bbl. oil daily.

Case H.—The wildcat San Andres well listed in the table was swabbed dry prior to acidizing. The spent-acid water, together with flocculated mud, returned very easily following the treatment. This formation contained amorphous silicates together with drilling mud which had been lost into the zone while coring.

Case I.—The last well listed in Table 3, in the Seven Rivers formation, Pimera pool, was shot with 128 qt. of nitroglycerin after it tested 2 bbl. oil daily. This formation was known to contain large quantities of clay minerals. The well then was treated with 500 gal. of silicate-control acid, resulting in production of 7 bbl. oil daily.

Conclusion

The results of the acid treatments in which the silicate-swelling control agents have been employed indicate the following as compared to conventional acid: (1) A greater increase in production, (2) a smaller amount of emulsion, (3) a shorter period of time for the oil to become of pipe-line quality, and (4) an easier return of the spent acid from the formation.

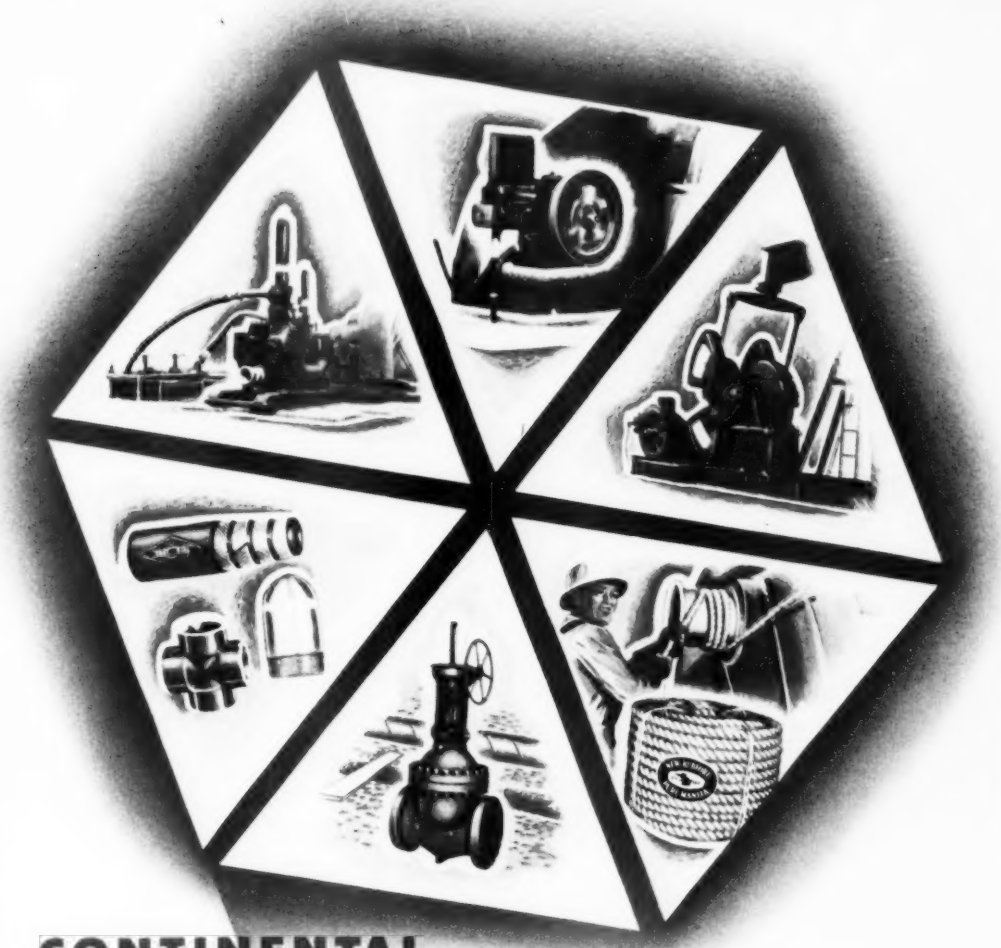
References

1. Hughes, R. V., "Importance of Clay Studies in Water Flood Operations," Producers Monthly, 11 No. 4, 13 (1947).
2. Hauser, E. A., and LeBeau, D. S., "Colloid Chemistry of Clay Minerals and Clay Films," (Edited Alexander), pp. 191-213, Vol. 6, New York, Reinhold Publishing Corp. (1946).
3. Hendricks, S. B., Nelson, R. A., and Alexander, L. T., "Hydration Mechanism of the Clay Mineral Montmorillonite Saturated with Various Cations," J. Am. Chem. Soc., 62, 1457 (1940).
4. Hofmann, U., and Bilke, W., "Intracrystalline Swelling and Base-Exchange Power Montmorillonite," Kolloid-Z., 77, 238 (1936).
5. Marshall, C. E., "Layer Lattices and Base-Exchange Clays," Z. Kirst., 91, 433 (1935).
6. Grim, R. E., "Relation of Clay Mineralogy to Origin and Recovery of Petroleum," Bull. A.A.P.G., 31, 1491 (1947).

BOOKS

WATER TREATMENT FOR INDUSTRIAL AND OTHER USES. By Eskel Nordell. Published by Reinhold Publishing Corp., New York. 526 pp. $10.

The writer has devoted more than 32 years to the field of water treatment. Under the opening chapter on industrial water supplies, considerable attention is given to municipal and private water supplies, standard methods of water analysis in addition to characteristics of waters from various sources. Considerable attention is given to the study of dissolved mineral matter, dissolved gases, aeration, deaeration, sedimentation, coagulation, settling and filtration, demineralization and distillation, and iron and manganese removal. The book is featured by a comprehensive treatment on the subject of boiler feed waters. Much attention is given to both sodium and hydrogen cation-exchanger water-softening processes. The principles, chemistry, and equipment employed in both cold and hot lime-soda processes and in hot and cold lime-soda-magnesia processes are thoroughly reviewed. The book is profusely illustrated with 126 graphs and photographs and 163 tables. It should prove to be a comprehensive, practical reference work for applications to the



CONTINENTAL

all the way!

Call Continental with confidence! Supplies and Equipment for every important operation in the oil and gas industries . . . for rig or refinery, for pipe-line or gas plant. Proven Continental "Green Triangle" Service, provided by 72 Continental stores and offices, is your guarantee of helpful assistance in solving your own equipment or supply problems.

CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

General Offices: DALLAS, TEXAS

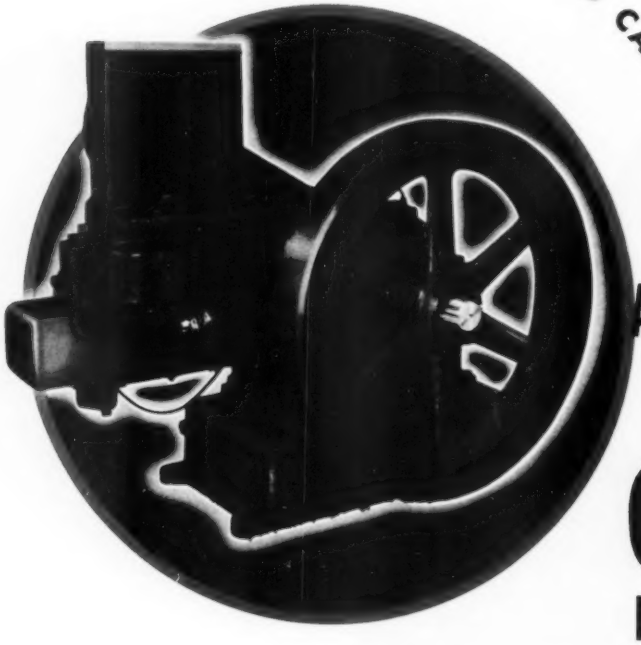
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

EXPORT DIVISION:
30 Rockefeller Plaza, New York City, New York

THE CONTINENTAL SUPPLY CO., Ltd.
216 Lancaster Bldg., Calgary, Alberta.

Representatives: ARGENTINA • BOLIVIA • BRAZIL • CHILE • COLOMBIA • ENGLAND • ECUADOR • PERU • TRINIDAD • URUGUAY • VENEZUELA

THRIFTIEST PUMPING ENGINE YOU CAN BUY...



Ask The Pumper Who Uses CSCO ENGINES

...He'll Tell You That:

- **You save money using CSCO engines.** You check and add oil or water without a shutdown. Gives you more time to do other work because there's no time lost!
- **You save money using CSCO engines.** They start quickly—no kicking—no need for expensive starters. Again . . . no time lost!
- **You save money using CSCO engines.** They can be easily and rapidly repaired on the job. No need for special wrenches. No time lost!
- **You save money using CSCO engines.** They provide steady, constant power at the exact speed you want. Just set the governor and put the same amount of oil in the tank each day. No time lost!

Yes, ask the man who runs 'em! Make your own comparison! You'll see that CSCO engines are the thriftiest pumping engines you can buy!

Write for bulletins, or visit your nearest Continental store, today!

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

THE CONTINENTAL SUPPLY COMPANY, *General Offices:* DALLAS, TEXAS

Export Division: The Continental Supply Co., Inc., 30 Rockefeller Plaza, New York, N. Y.
The Continental Supply Company, Limited, 216 Lancaster Building, Calgary, Alberta

Representatives: ARGENTINA • BOLIVIA • BRAZIL • CHILE • COLOMBIA • ENGLAND • ECUADOR • PERU • TRINIDAD • URUGUAY • VENEZUELA

fields of oil and gas, ceramics, plastics, rubber, textile, laundry, pulp and paper and many other industries.

THE CHEMISTRY OF HYDRAZINE. By L. F. Audrieth and Betty Ackerson. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. 244 pp. $5.

Hydrazine is one of the simple hydronitrogens. When dissolved in water hydrazine yields an aqueous solution with basic properties. Electrometric titration of such a solution indicates that hydrazine is a weak base and that it behaves primarily as a monoacid base; as such it resembles ammonia and the amines rather than the organic diamines. For many years, it has been considered a specialty chemical available only in aqueous solution and in the form of a few of its common salts. Discovery by the Germans during World War II that hydrazine possesses interesting properties as a fuel led to intensive investigations which are still in progress. However, the high cost of the manufacture of the basic chemical commodities, hydrazine, and hydrazine sulfate, has directed research towards synthesis of hydrazine from simple and available chemical materials. The mechanism of the oxidation of hydrazine in alkaline solution by oxygen furnishes one of the most interesting studies in the entire field of hydrazine chemistry; accordingly, the author has devoted an entire chapter to this topic citing 179 references. As many as 12 available methods for the quantitative methods of hydrazine are described.

ENGINEERING DATA BOOK. Published by the Natural Gasoline Supply Men's Association, 422 Kennedy Building, Tulsa 3, Okla. 161 pp.

The sixth edition of this volume of engineering data comprises one of the more important references for the natural gasoline and cycling industries. Systematically, the graphs and tables are arranged in basic sections covering the topics of gas measurement, compressor data, water data and fliud flow, steam tables, electrical data, natural-gas section, process and light hydrocarbons, and storage and piping data. Fully 35 pages are devoted to processing and light hydrocarbon characteristics, including data on thermodynamic properties, equilibrium constants, vapor pressures, physical constants, specific heat of vapors, absorption and stripping factors, and the like. Under the compressor-data section are found performance estimates for gas-engine-driven compressors, molal heat capacities, centrifugal gas-compressor data, basic brake-horsepower required curves, cooling-water requirements, enthalpy, and entropy applications

PETROLEUM GEOLOGY. By Kenneth K. Landes, professor of geology, University of Michigan. Published by John Wiley & Sons, Inc., New York. 660 pp. $10.

This amply illustrated book covers the geological occurrences of, the geographical distribution of, and techniques for locating oil and gas deposits. It emphasizes a practical approach to petroleum geology in explaining how oil and gas are trapped and how these traps may be discovered. Up-to-date data are presented as the manuscript was not closed to new material until July 1950. Written for the student of petroleum geology regardless of whether he is in the classroom or on the job, this book includes inset maps with most oil-field illustrations so that the geographic location and the position relative to other fields can be seen at a glance. For the benefit of the geologist who does not know the stratigraphy of distant places, formation names are followed in parentheses by the name of the geologic period. In the introductory chapter of this book a brief history of the petroleum industry is given and then begins the three parts, each a concentrated book in itself.

Aluminum Covered
BUTLER Steel Buildings

This Butler Building, with lightweight, sturdy, reflective aluminum covering, is used as oil company reclamation shop at Tulsa, Okla.

Permanent, fire-safe shelter for loading pumps, provided by Butler Building at Wichita Falls, Tex.

Rigid frame, truss-clear construction gives maximum bulk storage in Tulsa, Okla., oil company warehouse.

Standardized steel buildings with these outstanding advantages of Butler Aluminum Covering: has high reflectivity for insulation against summer heat, winter cold; requires little maintenance ... gives longer-lasting service; makes a lightweight structure, yet assures sturdy, durable construction; can be easily taken down and re-erected. And there are other big Butler advantages; rigid-frame, truss-clear design; low cost, fire-safe, weathertight. Butler Buildings—proved in oil field use for more than 40 years.

BUTLER

BUTLER MANUFACTURING COMPANY

Kansas City, Mo.
Galesburg, Ill.
Richmond, Calif.
Birmingham, Ala.
Minneapolis, Minn.

MAIL COUPON TODAY

For Prompt Reply, Address:
7464 E. 13th St., Kansas City 3E, Mo.

*Send full information about Butler Aluminum Covered Buildings for use as*_____

Name_____

Firm_____

Address_____

City_____ Zone___ State_____

CORROSION and its control

Magnesium Anodes Groups

IN the cathodic protection of coated pipe lines, it is usually advisable to install magnesium anodes in groups, sometimes draining as much as 3 or 4 amp. from a single location. Several factors have to be taken into account in the design of such groups, in order to obtain the desired values of current and anode life. Among the factors which will influence the current output per anode, and thus the size of the group and the anticipated life, are:

1. The soil resistivity in the immediate vicinity of the anode.

1a. The soil resistivity at greater depth.

2. The size of the anode selected.

2a. The kind and amount of backfill used.

3. The spacing between anodes.

3a. The number of anodes in the group.

4. The potential of the cathode; i.e., the pipe-to-soil potential after the installation is complete and polarization has taken place.

5. The distance of the anodes from the pipe line.

6. The depth of burial of the anodes.

The following treatment is partly theoretical and partly empirical; instead of attempting a complete mathematical analysis of this complex problem, a step-by-step consideration of the several factors in the approximate order of the magnitude of their influence is made.

Fig. 1—Effect of soil resistivity on current output of a standard 17-lb. packaged magnesium anode, assumed to be connected to a large, remote cathode at 0.6-volt potential, referred to a copper-copper sulfate electrode.

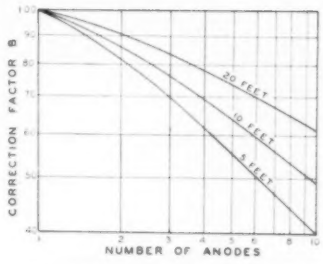


Fig. 2—Reduction in current output per anode when several are connected together at 5, 10, and 20-ft. spacing; anodes assumed to lie in a straight line.

Factors 1 and 1a.—Holding all of the variables fixed, except (1) and (1a), and assuming that they are equal, it is possible to determine the dependence upon soil resistivity of the current output of a standard packaged 17-lb. anode at 6-ft. depth against a very large steel cathode at 0.6-volt potential. It is assumed that the cathode is so large that its potential is not affected by the anode current, and so distant that there is no "proximity effect." This relationship is shown graphically in Fig. 1. The current output read from the curve may then be modified by various factors to allow for the effects of the other variables mentioned.

Factors 2 and 2a.—The correction factor "A" given in the accompanying table corrects for various sizes of anodes in common use and for different quantities of backfill. It is assumed that all of the backfill has the resistivity value of 50 ohm-cm; most formulas in general use approximate this value.

Anode and backfill—	Factor "A"
17 lb.—packaged	1.00
32 lb.—packaged	1.16
9 lb.— 6 by 24 in.	.93
17 lb.— 6 by 30 in.	1.09
32 lb.— 8 by 30 in.	1.24
50 lb.—10 by 26 in.	1.30

Factors 3 and 3a.—When anodes are installed in a group, the current output per anode is less than would be obtained from an isolated anode, because of the "crowding" effect of the higher current density in the soil. Correction factor "B" is shown in Fig. 2 for groups up to 10, spaced in a straight line at 5, 10, and 20 ft. The values shown are valid for soil which is of uniform resistivity to great depth; if there is a relatively shallow stratum of low-resistivity soil underlain with soil having much higher resistivity, the rate of decline in current output per anode is considerably greater than indicated. Such conditions must be determined in the field, usually by observing the decline as the first few anodes are connected singly; frequently it is necessary to install a smaller number than had been planned at a given site, and to install other groups along the line.

Factors 4 and 4a.—The potential of the pipe line, and the distance between it and the anodes, remain to be considered. Correction factor "C" is shown in Fig. 3. This factor will be found to vary from the indicated values more in actual practice than either of the others given, and the values in Fig. 3 must not be considered as better than a very rough approximation. Theoretically, if the coating on the line were perfect, there would be no difference in the performance of anodes at 5 ft. and at 20; if, however, the coating were truly perfect, there would be no current flow to the pipe at all. Actually, on lines with the best coating, the behavior at all reasonable distances may be considered as that shown for "remote."

Since it may be presumed that the complete protection of the line is being attempted, the design should be made on the assumption that a potential of at least 0.8 volt (to a copper-copper sulfate electrode) will be reached, although the value at the time of installation of the particular group under consideration may be much less. At the station itself the potential will probably be 0.9 volt or higher, and the proper value of the average potential of the section to which current is flowing from any one station becomes a matter of estimation.

The procedure outlined cannot be recommended as a method for making an office design which can be depended upon to work out in the field, nor does any such procedure exist at the present state of the art. The discussion may prove useful in estimating, however, and should also serve as a guide to the understanding of what is taking place as the currents and potentials change during the process of installation of a system of magnesium anodes. Although reasonably good estimates may be made from surveys, really good installations can only be designed in the field, while the work is actually in progress.

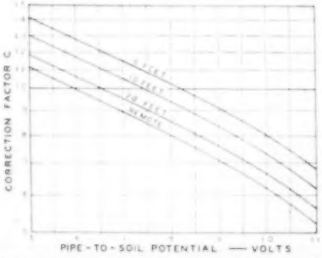


Fig. 3—Change in anode current output with change in potential of pipe. Anodes are assumed to lie in a line parallel to the pipe, at the distances indicated (see text).

Part 12 of a series by Marshall E. Parker, consulting engineer, Houston.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

Petrochemical Manufacture-1

We hear so much of chemicals from petroleum that we need an explanation of what some of these chemicals are. Can you explain in a simple way what the petrochemical industry is?—P. F. C.

There is no way to make petrochemical manufacture simple, because of the myriad chemical products that can be and are being derived from petroleum. Although only a few dozen petroleum-base stocks are produced, the derivatives of these number in the hundreds. Two issues of the Questions on Technology page are required, so also see next week's issue.

It is possible for oil companies or their subsidiaries to undertake the manufacture of chemical products by pushing aside already-established chemical manufacturers but such an approach is difficult. Rather, the oil companies must, to a large extent, await the development of new uses for chemical products and then undertake to supply the raw stocks such as ethylene, propylene, benzene, etc., that are required. The main difficulty in directly entering the chemical field is the large and experienced chemical sales staff required. A single base stock, such as ethylene, leads to several major chemicals, such as ethyl alcohol, ethylene oxide, ethylene glycol, etc., and each one of these products may lead to dozens more. The sales staff must be ready and able to follow all of these many leads.

Nevertheless, an increasing number of operators have been producing chemicals from petroleum and natural gas:

	No. of companies*
1935-1936	1
1937	2
1939	4
1940	5
1941-1943	24
1944	48
1945	51
1946	56
1947	58
1948	60
1949	61

*Approximate or estimated.

The number of operators is undoubtedly incomplete because many operations are conducted on second or third derived compounds that no longer seem to be much related to petroleum. The number of operators during the years 1944-1948 appears to be large because of the many plants operated by Rubber Reserve Corp. of the U. S. Government. Only a few such plants are listed for 1949.

Some of the refiners and chemical manufacturers that employ petroleum or petroleum stocks as basic charge stocks are indicated in Table 1.

TABLE 1—SOME PETROCHEMICAL MANUFACTURERS (1949)*

American Mineral Spirits Co.
Atlantic Refining Co.
Celanese Corp. of America
Cities Service Oil Co.
Cities Service Refining Corp. (R.R.)
Continental Oil Co.
Copolymer Corp. (R.R.)
Dow Chemical Co.
Dow Chemical Co., Styrene Div. (R.R.)
Du Pont de Nemours, E. I., & Co., Inc.
Esso Standard Oil Co., Louisiana Div.
Ethyl Corp.
Ethyl-Dow Chemical Co.
General Petroleum Corp.
Gulf Oil Corp.
Humble Oil & Refining Co.
Humble Oil & Refining Co. (R.R.)
Jefferson Chemical Co., Inc.
Kendall Refining Co.
Magnolia Petroleum Co.
Monsanto Chemical Co.
Neches-Butane Products Co. (R.R.)
NuGuard Chemicals, Inc.
Nuodex Products Co., Inc.
Pan American Refining Corp.
Phillips Petroleum Co.
Pure Oil Co.
Richfield Oil Corp.
Sharples Chemicals, Inc.
Shell Chemical Corp.
Shell Oil Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co., Inc.
Sonneborn, L., Sons., Inc.
Sonoco Products Co.
Standard Oil Co. of California
Standard Oil Co. of Indiana
Warwick Chemical Co. (Sun Chem. Corp.)
Sun Oil Co.
Tennessee Eastman Corp.
Texas Co.
Union Carbide & Carbon Corp., Carbide and Carbon Chemicals Div.
Union Oil Co. of California
Witco Chemical Co.
Wyandotte Chemicals Corp.

*There are undoubtedly many others. A few of the manufacturers produce fewer chemicals from petroleum than from other base stocks.

The pounds of petroleum products produced since 1942 have been:

1942	500,000,000
1943	2,434,914,665
1944	3,462,625,000
1945	3,310,021,000
1946	3,523,305,000
1947	3,133,864,000
1948	3,914,307,000
1949	4,986,768,000

The yearly production of some of the major chemical base stocks are shown in Table 2.

In next week's issue, the major manufacturers of chemicals from petroleum will be indicated and some of the many chemical base stocks and derivatives will be listed.

All of the information given here was taken from the yearly issues of "Synthetic Organic Chemicals" of the U. S. Tariff Commission.

Antifreeze for Gasoline

Can you direct us to something about an antifreeze agent for gasoline? We have read of it some place, but cannot recall the manufacturer.—R. P. C.

The agent referred to is probably du Pont's Gas Guard. It was developed to prevent the freezing of moisture in the feed lines of internal-combustion engines. It is said to absorb moisture from gasoline, thereby preventing ice formation during freezing weather. As much as 10 oz. of water in 15 gal. of gasoline can be tolerated at a temperature of minus 30° F., when the antifreeze agent is employed.

TABLE 2—PRODUCTION OF CHEMICAL BASE STOCKS FROM PETROLEUM
(In millions of pounds)

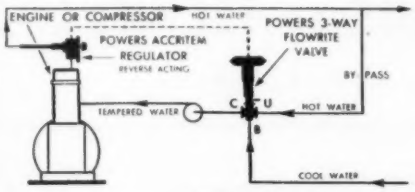
	1943	1944	1945	1946	1947	1948	1949
Cresylic acid	13.9	(†)					
Naphthenic acids	17.3	28.5	30.1	28.9	32.0	25.4	23.7
Toluene, total	*870.0	*658.0		69.7	198.2	358.8	330.6
Aviation grade		244.0					
Xylene		354.6	334.2	265.2	238.6	382.7	356.1
Other aromatics			481.4	240.1	173.3	125.1	282.3
Ethylene	166.2	272.2	308.2	294.6	342.0	383.4	1,151.5
C_3 hydrocarbons, **total**	**394.6**	**214.6**	**179.3**	**208.6**	**464.0**	**713.6**	**1,087.3**
Propane							800.2
Propylene and C_3 mixes							287.1
C_4 hydrocarbons, **total**	**771.6**	**691.3**	**1,666.0**	**2,186.6**	**1,456.8**	**1,656.7**	**1,459.2**
1,3-Butadiene, rubber grade	103.1	488.9	779.8	1,074.0	696.4	660.9	493.8
1 and 2-Butene fraction		202.4	305.9	632.1	490.2	820.4	613.4
Isobutylene			140.9				
Butadiene-butylene fraction			183.8				
Others	668.5		255.6	480.7	272.2	175.3	352.0
C_5 hydrocarbons, total				42.3	12.7	13.0	
Diisobutylene						9.2	10.7
Other aliphatic hydrocarbons			311.0	187.0	214.3	246.2	285.4
Miscellaneous hydrocarbons	201.2	1,243.4					

*Approximate and does not include production of ordnance plants. †Discontinued because suppliers did not wish to disclose sources.

Before You Buy

JACKET WATER TEMPERATURE CONTROL

Investigate

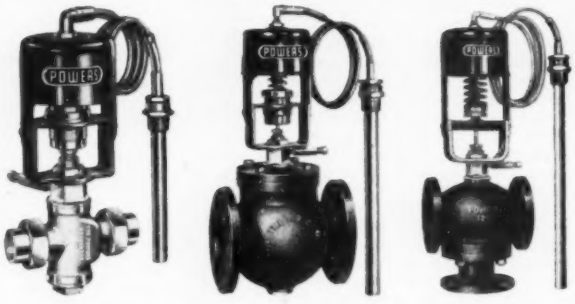


One of Many Applications of
POWERS ACCRITEM REGULATOR and FLOWRITE DIAPHRAGM VALVE—
Compressed Air or Water Operated

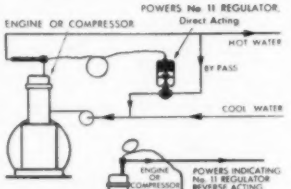
—Provides positive, dependable control for large size 3-way or 2-way valves. ***Safety feature*** of hook-up above: failure of air or water pressure allows only cooling water to flow through the valve to engine.

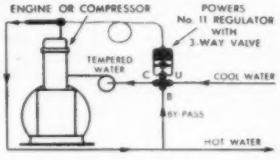
POWERS

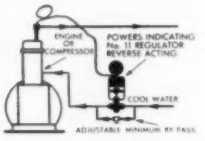
No. 11 Self-Operating TEMPERATURE REGULATORS

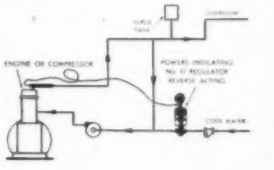


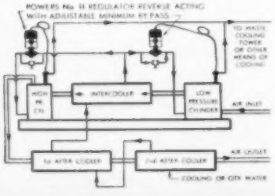
Provide dependable control for most applications. They're simple, ruggedly built, economical and easy to install. Especially suited for air compressors, diesel and gas engines. Temperature indicating regulator also available.

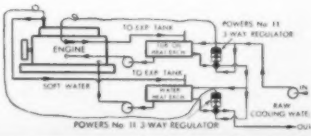









POWERS No. 11 REGULATOR REVERSE ACTING WITH ADJUSTABLE MINIMUM BY PASS
TO WATER COOLING TOWER OR OTHER MEANS OF COOLING
INTERCOOLER
LOW PRESSURE CYLINDER
AIR INLET
AIR OUTLET
TO AFTER COOLER
AFTER COOLER
COOLING OR CITY WATER



Complete Line of Dependable, Time-Tested Regulators

IMPORTANT ADVANTAGES that quickly pay back the cost of Powers self-operating and pneumatic controls for air compressors, diesel and gas engines:

- **Correct jacket water and lube oil temperature at all times, regardless of load or seasonal changes.**
- **Improved lubrication and cylinder liner wear.**
- **Fewer piston ring replacements.**
- **Saves Labor; increases efficiency.**
- **Reduces danger of piston seizure.**
- **Eliminates sludging.**
- **Lowers fuel and lube oil consumption.**

Cost of Powers jacket water temperature control? About the same as a set of new piston rings. Powers regulators are unsurpassed for reliability and years of trouble free service.

Have a POWERS Engineer call to study your requirements for better jacket water temperature control. There's no obligation. Phone or write our nearest office.

CHICAGO 14, ILLINOIS • 2707 Greenview Avenue
NEW YORK 17, NEW YORK • 231 East 46th Street
LOS ANGELES 5, CALIF. • 1808 West 8th Street
TORONTO, ONTARIO • 195 Spadina Avenue
MEXICO, D. F. • Edificio "La National" 601
(DIG)

Established 1891 **THE POWERS REGULATOR CO.** OFFICES IN OVER 50 CITIES

More on Grease Applications*

CERTAIN factors inherent in machinery which influence application of greases have already been discussed. Factors related to environment in which machine is operated or maintained will be dealt with in this concluding installment on greases. Possibility of contamination and the method of application are examples of such factors.

Lubricant contamination. — This may result from dust in dry weather or moisture in wet weather. The lubricant may also become contaminated by the product being processed as, for example, acids or other chemicals in certain types of pumps. To prevent or minimize entry of foreign matter, the open ends of the bearing may be sealed by mechanical means. However, when construction of mechanical seals is not feasible, the lubricant itself must act as the sealing agent. Fluid lubricants obviously cannot meet this requirement but greases, because of their plastic consistency and directional fluidity, can lubricate the bearing when shearing forces are exerted. Yet the plastic grease at the open ends of the bearing remains undisturbed and acts as an effective seal against foreign matter.

The sealing ability of grease is also important in machine operation where the product of the machine might be damaged by escaping lubricant. For instance, in processing foodstuff or textiles, leakage of lubricant could become a serious matter.

*From material prepared by Shell Oil Co. on "Fundamentals of Lubricating Greases."

Methods of application.—Greases may be applied at relatively infrequent intervals because of their stay-put ability. Methods of application have gone through many stages of improvement to the modern, automatic centralized lubrication system. Whatever the method of application—grease cup, grease gun and fitting, or completely automatic centralized system—the advantages of the "interval method" of applying greases are utilized.

Centralized systems have grown rapidly in recent years. Such systems consist of a pump, either manually or power operated, that pumps grease at intervals from a reservoir through a system of small pipes to metering devices. These, in turn, measure and apply the lubricant to the various bearings of a machine. Exactly the right amount of lubricant is applied at exactly the right time interval to each bearing served by the system. No bearings are overlooked or forgotten and both over and underlubrication are avoided. Centralized systems combine the advantages of automatic, or at least centralized "one shot" lubrication with the advantages provided by grease lubricants.

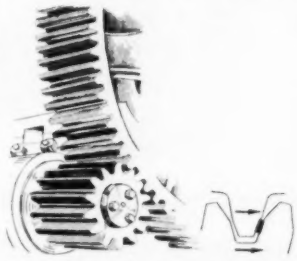


Fig. 3—EXPOSED GEARS—Where exposed gears are so located that it is impractical to lubricate them frequently, grease can maintain a protective film for long periods. This is particularly important where gears are operated under heavy or shock loads when relatively small areas of contact carry the load and squeezing action is constantly taking place.

Summary.—In general, the stay-put ability of greases permits the interval method of application. Their directional fluidity allows them to serve as excellent lubricants and also permits them to be pumped in centralized systems through supply lines of small diameter. Available greases of specific types are suitable for a wide variety of operating conditions. For example, certain lithium greases can be pumped through supply lines at temperatures as low as 90° F. below zero. Because of their plastic consistency, greases have excellent ability to seal the open ends of bearings.

From the discussion in this series of modern lubricating greases, it becomes evident that they are a unique class of lubricants with a wide range of applications. Although specific applications cannot be dealt with in detail, it is also evident that these products are not mere "substitutes" for fluid lubricants.

Fig. 1—CAMS AND ROLLERS—Delivery of lubricant and maintenance of a protective film on bearing surfaces is a problem in exposed cam-and-roller-type mechanisms. A thick, long-lasting, protective film can be established, however, by grease lubricant due to its plastic, semisolid nature and inherent tackiness.

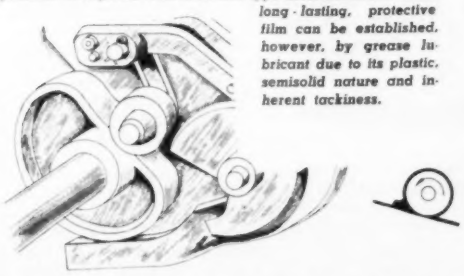
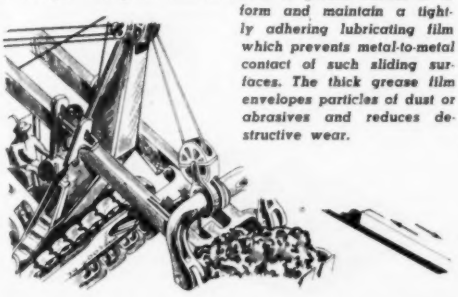


Fig. 2—RECIPROCATING, FLAT-SURFACE BEARINGS—Bearings consisting of flat surfaces (steam-shovel dipper sticks, elevator guides, fifth wheels on semitrailer trucks) cannot build up a lubricant wedge. The polar characteristics of grease enable it to form and maintain a tightly adhering lubricating film which prevents metal-to-metal contact of such sliding surfaces. The thick grease film envelopes particles of dust or abrasives and reduces destructive wear.



the Magic
SPICER BROWN-LIPE SYNCHRO-SHIFTER

puts more productive horsepower into driving wheels!

HOW IT WORKS

1 The gear on the main shaft free-wheels until needed, but is always in mesh with the gear train. The main shaft is directly connected to the rear end, and revolves at a speed proportional to the road speed of the vehicle.

2 The gear is brought to shaft speed (synchronizing it) by pressing a special bronze cone against the mating cone on the side of the gear. This bronze cone is part of a sleeve which is held on the shaft by the shifter gear, being free enough to rock through a small angle.

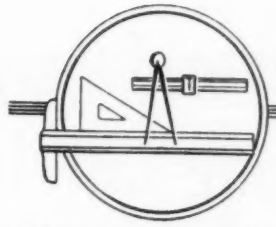
3 When the gear is synchronized with the shaft, the shift is made by engaging the shifter clutch, which is shown here. Since the gear is now standing still as far as the shifter-clutch is concerned, the teeth are easily pushed into mesh.

4 Sliding shifter clutch (view 3) forces sleeve (view 2) to move ahead of it, under spring pressure. Cone friction turns sleeve, sleeve traps posts on shifter clutch. Force on shift clutch passes directly to friction cone. Shifter clutch is then held until cone no longer exerts turning force on sleeve, after which shifter clutch slides into tooth engagement.

47 YEARS OF Spicer SERVICE

SPICER MANUFACTURING • *Division of Dana Corporation*
TOLEDO 1, OHIO

TRANSMISSIONS CLUTCHES • PARISH FRAMES • POWER TAKE-OFFS • PROPELLER SHAFTS • SPICER "BROWN-LIPE" GEAR BOXES
STAMPINGS • FORGINGS • TORQUE CONVERTERS • PASSENGER CAR AXLES • UNIVERSAL JOINTS • RAILWAY GENERATOR DRIVES



ENGINEERING fundamentals

No. 444

Water-Flooding Tests

THE production of oil by water has been discussed at great length in the literature and particular emphasis has been placed upon various flooding tests to indicate the nature of oil production by water flooding. Not only flooding tests but also relative permeability tests have been used in this respect. The present discussion will consider the types of flooding tests and the factors which have been shown to be important in water flooding.

Water-flooding tests are usually either the flood-pot type or the long-core type. The former were early developed from radial diamond cores. The technique employed is to cut a cylindrical hole coaxial with the core itself and in the center of the core. A 2 or 3-in. length of core is used. This system can then be flooded radially from the center hole outward or from the outer edge inward. This test is simple, rapid, and can be run on ordinary diamond cores. When a core is cut directly across the bedding plane the flood test is carried on parallel to the bedding plane. The flooding distance is something of the order of an inch.

A disadvantage of this type flooding is the short distance of flood travel, as a consequence of which boundary effects become quite important unless the tests are run at high pressures. Flooding tests on long cores were designed to overcome the disadvantages of flood-pot tests. Although there is some question that the boundary effects are eliminated in long cores, and the long core cannot be taken from the ordinary diamond core, a long-core flooding test gives a better over-all picture of flooding. Of course, since the distances flooded are usually a matter of feet rather than an inch, the times required to make a flooding test are considerably longer.

A third type of flooding test, that made through a capillary diaphragm, has also been reported.[1] The chief disadvantage to this type of flooding test is that it does not permit the complete movement of all types of fluids through the core system. On the other hand the test can be run rapidly or slowly to permit different rates of drainage on small samples without fear of boundary effects.

It is generally agreed that production of oil by water flood can be divided into two portions. Buckley and Leverett[2] have named these the initial and subordinate phases of production. The former constitutes that oil produced before the breakthrough of water into the producing stream and the latter is that oil produced after water has broken through into the producing stream. The water-oil ratio during the initial phase is zero and during the subordinate phase increases from zero to infinity. The operator of a flooding test must choose some time for cessation of the test. This is at some point during the subordinate production, perhaps when the water-oil ratio reaches a set figure. The residual oil is that reported at the cessation of the experiment and it may therefore depend upon the relative importance of the initial and subordinate phases of production.

Experimental Results

Experimental results have been reported wherein production during the subordinate phase has been practically zero. This has led some to the conclusion that displacement of oil by water is always pistonlike in nature. However, other experiments have shown a subordinate phase of considerable magnitude. There have been some flooding experiments reported in which water appeared with first production so that all was subordinate phase.

The relative viscosity of oil to water has been shown both experimentally and theoretically to have a control on the relative magnitudes of the initial and subordinate phases of production. In general, as the oil viscosity goes up for a given water viscosity the smaller will be the amount of oil produced in the initial phase and the greater the amount produced in the subordinate phase, if it is accepted that the final residual oil is not dependent upon the oil viscosity.

The theoretical approach presented by Buckley and Leverett[2] is based on the relative-permeability curve, so that any factors entering into the change in relative permeability should be a factor in governing flooding. These factors would be (1) por geometry (i.e., different curves for different cores), (2) relative wettability (i.e., interchanging of the oil and water relative permeabilities), (3) gas saturation (i.e., change from two-phase to three-phase relative permeability).

All of these quantities have been shown by flooding tests to be important variables. Comparisons between flooding different systems[1] and with different wettability properties have been made.[3] Presence of gas has been demonstrated to markedly affect the water flood process.[4]

Other factors are also said by some to be important, although they do not apparently affect the relative-permeability curve. Pressure gradient, or flood velocity, is the foremost of these. Flooding tests show many different conclusions relative to the effect of pressure gradient and it is impossible to state definite knowledge of the effect of the factor at this time. Due to the inaccuracy of flood-pot tests at low gradients, results based on such tests are almost necessarily excluded from consideration.

Interfacial tension is also said to be a possible factor. It is generally accepted that a decrease in the interfacial tension will result in lowered oil residual. There are however no reported tests showing this quantity to be the cause of flooding variations.

These individual factors will be discussed in somewhat more detail in later articles.

References

1. Welge, Displacement of Oil From Porous Media by Water and Gas, A.I.M.E. Trans., Vol. 179, 1949.
2. Buckley and Leverett, Mechanism of Fluid Displacement in Sands, A.I.M.E. Trans., Vol. 146, 1942.
3. Kinney and Nielsen, Role of Wettability in Oil Recovery, M. I. Expt. Station, Pennsylvanian State College, Bulletin 4.
4. Holmgren and Morse, The Effect of Free Gas Saturations on Oil Recovery, presented A.I.M.E. annual fall meeting, New Orleans, Oct. 1950.

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, Penn State College

These Facts Prove Beyond Any Doubt That Goodall Long-Life Is

A BETTER BUY

On Every Count Than Any Other Rotary Hose

1. COUPLING - The original Barney Coupling is the only coupling that is stronger than the hose itself. It is the only coupling that can be reset to save your hose from the scrap heap.
2. CORD CONSTRUCTION - Goodall's flexible cord design provides the extra strength to withstand torsional twist . . . thus eliminating the cause of more than 90% of rotary hose failures.
3. FLEXIBILITY - Goodall Long-Life can be coiled into a convenient unit for transporting without slightest damage.
4. PERFECT BALANCE - The Goodall method of winding the multiple cords of the carcass and the steel cables of the pressure element at corresponding angles assures perfect balance.
5. GREATER STRENGTH - By actual test, Goodall Long-Life is the strongest hose ever built and it retains its strength better than any other hose.
6. REPAIR SERVICE - Goodall Rubber Company is the only rotary hose manufacturer that can protect your investment with a maintenance plan. Goodall maintenance provides a repair department in Houston where any length of Long-Life that meets with an accident can be renewed for the rest of its normal life. No length of Long-Life repaired in our shop has ever failed in service.
7. SALVAGE VALUE - Substantial allowances are made on every set of Barney couplings returned.
8. NO PREMIUM PRICE - The extra quality, longlife and high salvage value of Goodall Flexible Cord costs no more than ordinary rotary hose.

If you are not fully convinced of these facts, ask anybody who makes or sells rotary hose or write to me personally. We will contact you and fill in other details and answer your questions. Thanks.

Barney

GOODALL RUBBER COMPANY
TRENTON, N. J.

GOODALL RUBBER COMPANY OF TEXAS: Houston, Texas.
GOODALL RUBBER COMPANY OF CALIFORNIA: San Francisco, Los Angeles, Seattle, Salt Lake City.
GOODALL RUBBER COMPANY: New York, Philadelphia, Pittsburgh, Chicago, Denver, St. Paul.
EXPORT: Goodall Rubber Company, Trenton, N. J.
DISTRIBUTORS: Texas and Louisiana — Houston Oil Field Material Co.; Wilson Supply Co.
Oklahoma — Iverson Supply Co.

Goodall Has Been FIRST With Every Worthwhile Rotary Hose Development!

OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 MATERIALS-HANDLING EQUIPMENT is a new comprehensive catalog which covers general description and application data on gas and electric fork-lift trucks, motorized hand trucks, hand-lift trucks, and hand and electric hoists. *Yale & Towne Manufacturing Co.*

2 WESTINGHOUSE INDUCTION MOTORS. The large, polyphase induction motor, and where it fits into the industrial picture, is the subject of a new 28-page booklet. It also presents a quick summary of the features of Type CSF squirrel-cage motors for constant-speed drive, and Type CWF wound-rotor motors for adjustable speed drive. *Westinghouse Electric Corp.*

3 STAINLESS TUBING STEELS. A new four-page bulletin offers technical data valuable to engineers associated with the design, fabrication, and application of stainless tubing. It also contains condensed data on analyses, oxidation resistance, thermal treatment, and mechanical, electrical, and physical properties on 10 austenitic and ferritic stainless tubing steels. *Babcock & Wilcox Tube Co.*

4 PIPE LINE COATINGS AND WRAPPERS. A new line of protective coatings and wrappers for pipe lines is covered in Bulletin 511. Features include freedom from holidays, extreme resistance to water, water vapor, chemical and bacterial action; high resistance to mechanical damage, and high dielectric strength. *Trenton Corp.*

5 OIL FILTERS. A 52-page colorful catalog contains complete information and illustrations of DeLuxe Oil Filters, replacement cartridges, and new removable sedisumps for all trucks, tractors, and power units. *DeLuxe Products Corp.*

6 ELECTRONIK POTENTIOMETERS. Catalog 15-15 covers Electronik electric control potentiometers for both contact and proportional control. Engineering and constructural data, types of control, partial list of available ranges, application data, and accessories are described. *Minneapolis-Honeywell Regulator Co.*

7 AMERICAN BLOCKS AND SHEAVES is a new informative catalog describing a complete line of blocks and sheaves. Information includes block number, capacity in tons, number of sheaves, rope size, and weight of each block. A section on "How to figure line parts," with illustrations, ratio table, and formula will make reeving and line part figuring easy for riggers. *American Hoist & Derrick Co.*

8 PIPING POINTERS is a new manual which covers the fundamentals of sound piping practices in nontechnical language, and the various types of valve designs and how each should be used. Included with the manual is a valve selection guide to be used in selecting valves for common piping services. *Crane Co.*

FOR MORE INFORMATION . . . . use one of these cards

Postage Will Be Paid by Addressee

No Postage Stamp Necessary if Mailed in United States

BUSINESS REPLY CARD

Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
BOX 1260
TULSA, OKLAHOMA

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50

For further information—without obligation—I have checked numbered circles above

Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, May 24, 1951

PLEASE PRINT

COMPANY NAME .....

STREET ADDRESS .....

CITY ..... ZONE NO. ..... STATE .....

NAME ..... TITLE .....

OIL AND GAS EQUIPMENT Digest — CHECK IT

9 BANTAM EQUIPMENT such as shovel, trench hoe, dragline, clamshell, five-ton crane, magnet pipe driver, and antifriction bearing hoist are described in a colorful 21-page catalog. Specifications on each unit are also included. *Schield Bantam Co.*

10 HAMMOND FLOATING ROOF TANKS, an eight-page brochure describes in detail three types of floating-roof tanks with "Springtite" seal for product conservation and corrosion resistance. *Hammond Iron Works.*

11 ROCK BITS. Bulletin 51-R illustrates and describes the "2-cutter" and "4-cutter" rock bits and the type of formation for which each is best suited. These bits are made standard sizes up to 26 in. for regular drilling, and in 3¾ to 5⅞-in. sizes for geophysical work. *Globe Oil Tools Co.*

12 DRESSER COUPLINGS, an extensive new 34-page catalog describes Style 38 couplings and Style 40 long sleeves for joining steel and cast iron pipe. It also covers compression fittings and contains a spread illustrating the principal types of clamps, repair sleeves, expansion joints, and other products. *Dresser Manufacturing Co.*

13 HYDRAULIC U-BEND PULLER is a new development for Type 3600 refinery return-bend fittings. Bulletins include descriptive matter and specifications. *Key Co.*

14 CAMCO GAS LIFT EQUIPMENT is a catalog explaining various flow valves, surface controllers, motor valves, retrievable equipment, and other pertinent information. Charts, tables, and installation data are shown. *Camco, Inc.*

15 WORTHITE SPECIALTIES is a new bulletin describing valves, flanges, hose nipples, bars, welding electrodes, and screw machine products, with dimension tables and illustrations. *Worthington Pump & Machinery Corp.*

16 "NEMCO" CLASS 500 OIL FIELD MOTOR STARTER. Bulletins and price lists are available on this motor start, designed to provide control and protection for electric motors of oil well pumping units. *Nelson Electric Manufacturing Co.*

17 TORQUE-ARM SPEED REDUCERS is a 12-page multicolored bulletin describing speed reducers in four sizes with capacities up to 27 hp. and developing output speeds from 115 to 330 r.p.m., together with complete specifications and price lists. *Dodge Manufacturing Corp.*

18 PORTABLE LIGHT AND POWER ASSEMBLIES. Combinations and variations of Joy String-a-lite lighting and tool tap-off assemblies are pictured and described in a new 12-page, 2-color bulletin. *Joy Manufacturing Co.*

19 BURNERS FOR INDUSTRY is a four-page brochure covering a series of gas and oil burners, together with information on gas pressures and stacks for small boilers. *John Zink Co.*

20 WATER CONDITIONING EQUIPMENT is described in an eight-page illustrated folder, which gives information covering ionXchange equipment including softeners, hydrogen zeolite, deionizers and the newly developed Illco-Way mixed-bed de-ionizer. Bulletin also includes specifications on Illco-Way "package-type" units available for flow rates up to 1,000 g.p.h. *Illinois Water Treatment Co.*

21 TORQUE CONVERTER ISSUE. This is a special issue of Production Road. Schematic drawings and illustrations explain the operation, and field photographs show applications of this flexible power-transmission equipment. *Twin Disc Clutch Co.*

22 LANGITE. The production of cork, the raw material for Langite gasketing and packing materials, is described. In addition to special tables, many application illustrations make this an interesting booklet. *Cork Manufacturing Co., Ltd.*

23 OIL FIELD ASSEMBLY CHAINS. New catalog RO-51 shows how roller-chain drives can be applied to a wide range of oil and drilling equipment to step up output and reduce costs. Comprehensive contents include details on oil-field assembly lacing arrangement, chain illustrations, dimensions, and tables. *Whitney Chain Co.*

FOR MORE INFORMATION . . . . use one of these cards

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50

For further information—without obligation—I have checked numbered circles above

Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, May 24, 1951

PLEASE PRINT

COMPANY NAME .....

STREET ADDRESS .....

CITY ..... ZONE NO. ..... STATE .....

NAME ..... TITLE .....

Postage Will Be Paid by Addressee

No Postage Stamp Necessary if Mailed in United States

BUSINESS REPLY CARD

Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

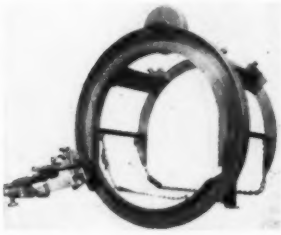
THE OIL AND GAS JOURNAL
BOX 1260
TULSA, OKLAHOMA

OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

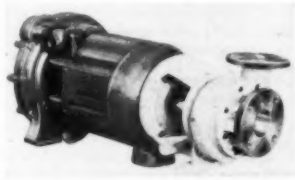
by Dan B. Miller

24 MATHEY PIPE-BEVELING MACHINE. Outstanding features of this machine include free wheeling the torch from closed to open position; complete closure of bridging gap, and true-circle cutting regardless of nonconformities in pipe. After cut is completed, a throwout clutch allows torch to be free-wheeled back to starting position. Operating in separate races, two racks completely encompass the circumference of the pipe. At a given point a pin in the front rack engages a pin hole in the section rack so that the front rack picks up the section rack bridging the split in the front rack. Thus the front and section rack complete a circle to carry the torch bracket entirely around the pipe. A hydraulic cylinder and a rider wheel mounted on the torch bracket keep the torch tip at the same distance from the pipe during its entire circuit, regardless of unevenness, thereby insuring a perfect-circle cut. *Perrault Brothers.*



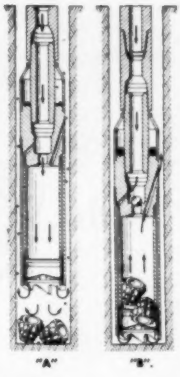
IT'S NEW CHECK IT

25 STEAM-TURBINE-DRIVEN BILTON PUMP is a combination of standard TL Bilton pump sizes with one of two Moon steam turbines. The two steam-turbine sizes have the same shaft extension and rabbet fit so that one standard connector and shaft sleeve is used with all pump and turbine combinations. No rigid foundation is necessary. It can be mounted at any angle and is sufficiently compact and light in weight for easy handling. The close-coupled construction assures positive alignment and permits effective application of power to pump. Standard models are recommended for water supply, air conditioning, general liquid handling, and for general-purpose application for plants using steam as their primary power and also for use as a standby pump in plants where steam is available as emergency power. Pump sizes are 1¼ to 3-in. Capacities to 600 g.p.m. Heads to 320 ft. Also available to special construction, including the mechanical seal for special temperature, chemical, or pressure factors. *Byron Jackson Co., Pump Division.*



IT'S NEW CHECK IT

26 COSTIN CONE AND JUNK CATCHER basically consists of two separate containers, one for holding small pieces of junk and the other for holding bit cones and larger parts to be recovered. As shown at "A" the tool is first run into the hole close to bottom, and as circulation is established in the normal way, all small pieces of junk are picked up and circulated with the mud stream up past the outside of the tool. Higher fluid velocity carries small parts up above the top of the tool where the slower circulation permits the small parts to fall back into the junk trap in the top of the tool. After the small parts have been cleaned out, a ball is dropped down the drill string to close off the normal circulation passages and establish a reverse circulation flow as shown at "B." The full fluid flow then travels down through outer passages to bottom of the tool where it jets inwardly against the larger pieces of junk, centering and washing them up into the main junk basket in the lower end of the tool. *Baash-Ross Tool Co.*



IT'S NEW CHECK IT

27 ELKOTE is a new ceramic coating for metals and alloys that withstands oxidation, corrosion, flexing, vibration, percussion, and severe thermal shocks. It pro-

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

with

GENUINE GARDNER-DENVER SLUSH PUMP PARTS

Only by insisting on Gardner-Denver genuine parts can you be assured protected performance—the power and stamina for which Gardner-Denver Slush Pumps are famous.

[redacted] Gardner-Denver parts are engineered especially to match the high quality of Gardner-Denver Slush Pumps.

Gardner-Denver has the authoritative knowledge to give you maximum value in materials and design.

Gardner-Denver has a vital interest in helping you maintain your Gardner-Denver Slush Pumps at peak efficiency.

Genuine Gardner-Denver parts are available through branch offices, stores and agents in all oil fields throughout the world. Gardner-Denver trained service men are readily available to assist in the installation of Gardner-Denver parts.

SINCE 1859

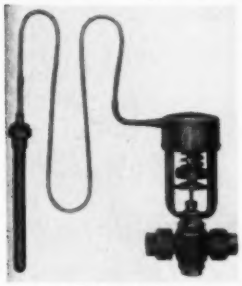
GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada:
Gardner-Denver Company (Canada), Ltd., Toronto, Ontario
Dallas • Houston • Tulsa • St. Louis • Los Angeles • San Francisco
New York • Chicago • Pittsburgh • Denver • New Orleans
Continental Supply Co., Continental Bldg., Dallas, Texas
Export Division: 30 Rockefeller Plaza, New York, N. Y.
Republic Supply Co. (Of Calif.), 2600 S. Eastland Ave., Los Angeles, Calif.
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

vides a protective barrier against corrosion and oxidation at temperatures up to 2,400° F. It also withstands prolonged immersion in corrosive liquids. It adheres firmly to metals of widely different coefficients of expansion, even when subjected to flexing, percussion, vibration, and sudden extreme temperature changes. The company offers to coat and return for test, metal samples submitted. *Elraco Engineering Co.*

IT'S NEW CHECK IT

28 NEW TYPE TEMPERATURE REGULATOR. This series of regulators has a press-formed frame of stainless steel, providing minimum heat conduction from the valve to regulator head, assuring better control, less weight, and a reduction in over-all dimensions. An extra-large, two-ply metal Sylphon bellows in the thermal unit provides added power for valve operation and assures long service life. Temperature range is from 40° to 440° F. Available in valve sizes ½ to 4-in. inclusive. Illustrated is the type of bulb used for liquids but supplied on order with fin-type bulb for air or gases. Also available with indicating thermometer and other special features to suit most any installation requirements. *Fulton Sylphon Division, Robertshaw-Fulton Controls Co.*



IT'S NEW CHECK IT

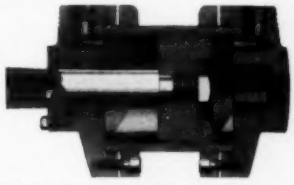
29 TYPE AK-3 HOOK-ON POWER-FACTOR METER permits direct measurement of power without cutting conductors or interrupting electrical service. It may be used on any balanced three-phase circuit. It gives direct power-factor readings in circuits with voltages ranging from 100 to 600 volts and currents from 15 to 600 amp. The new instrument is designed for use in industrial plants where maintenance of high power factor is an important economic consideration. Small, light, and portable, the meter can be used to locate easily those circuits where corrective action is needed. To operate the instrument, the user clips the voltage leads to the potential source, clamps the hook around the conductor, and rotates the selector dial to obtain the proper power factor reading. The meter gives readings accurate to within 0.05 power factor. It has a frequency range of 50 to 90 cycles, an effective scale length of 13.5 in. *General Electric Co.*

IT'S NEW CHECK IT

30 NEW RUBBER COMPOUND FOR MOLDED SEALS. O-rings and other precision molded seals may now be obtained in a newly developed extreme-temperature-range, synthetic-rubber compound. Resistant to nonfuel petroleum products such as lubricating oils and hydraulic fluids, the new compound, Parker 42, functions effectively in sealing performance anywhere in the temperature range of from minus 85° to plus 275° F. The compound is also especially satisfactory for service with ozone, having an ozone resistance of 0.003 per cent for 6 hours. Other physical characteristics of the new formulation are: tensile strength 2,000 psi.; elongation 300 per cent; Shore A hardness 60 plus or minus 5°; and permanent set 3 per cent. *Parker Apppliance Co.*

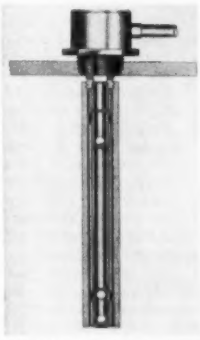
IT'S NEW CHECK IT

31 NEW HYDRAULIC CYLINDER. Covers may be rotated for any pipe connection and installation made in a minimum of space. External O-rings, instead of ordinary gaskets, are used as static seals, to provide for leakproof operation. Sealing efficiency of the ring improves with increased pressure. Automotive-type rings are used on the piston to reduce friction to a minimum. Other outstanding construction features are: self-adjusting composition rod packing; seal effect; proportional to cylinder pressure; oversize, ground, and polished alloy piston rod; heavy-duty alloy cast pistons with large bearing surfaces; seamless drawn steel tubing, precision honed; and heavy-duty alloy covers, bored to fit a turned diameter on tube. *Rivett Lathe & Grinder, Inc.*



IT'S NEW CHECK IT

32 ELECTRONIC LEVEL CONTROL for nonconductive liquids makes use of the electronic relay to transform the electronic circuit into an electrically controlled operation. The electrode is a tube open at the top and bottom. In the walls of this tube are the wire conductors of the electronic impulses. Within the tube itself are placed two hollow stainless-steel balls. These are held in position by pins in the tube, so placed that each ball will rise or fall a distance of 4 in. As the ball rises to the magnetic field in the casing the electronic impact on the cathode in the vacuum tube in the control case is changed, thus operating the controlling relay. In service the electrode can be any desired length. *Lumenite Electronic Co.*



IT'S NEW CHECK IT

33 AUTOMATIC LIQUID BLENDER is a new automatic proportioning system for blending two or more of a wide variety of liquids. No charts or calculations are used to set the blender for any combination of liquids. Simple controls on each meter permit instantaneous setting of ingredient proportions in increments to meet exacting needs. Total throughput is recorded on a master counter and each ingredient is recorded separately on its own meter. Failure of any ingredient sup-

ply automatically shuts off the entire system and if the supply to any meter slows down for any reason, all meters synchronize automatically to the same rate of delivery. If the number of ingredients is reduced at any time, one or more meters may be made inoperative. *Bowser, Inc.*

IT'S NEW CHECK IT

34 LIQUI-JECTOR. Large volumes and high pressures of compressed air and other gases with contaminating water, free oil, water-oil emulsions, and dirt are cleaned in a new series of Liqui-jectors. Units deliver clean air-gas continuously to instrument or pneumatic systems through specially prepared liquid-impervious ceramic filters. Liquids and dirt are ejected automatically. The devices do not have any moving parts. *Selas Corp. of America.*

IT'S NEW CHECK IT

35 IMPROVED WELD INSPECTION FOR PIPE LINES. Inspection with Magnaflux allows coverage of every foot of every weld to eliminate doubt and prevent failures at economical cost. Method employs local magnetic leakage caused by detrimental defects to attract and hold finely divided Ferro-Magnetic particles in a pattern on the weld surface. This power pattern builds up as the weld is locally magnetized with high-amperage currents, to indicate the exact location, extent, and type of defect. The equipment and technique reveals detrimental internal defects such as lack of penetration, as well as surface cracks. Defects may be chipped out, rewelded, and reinspected without expensive cutouts and consequent extra labor. Since the attraction of the particles and the forming of a pattern is a visible phenomenon, visual inspection can be made simultaneously with Magnaflux inspection. Circumferential welds can be inspected up to a mile per day at low inspection cost. *Magnaflux Corp.*

IT'S NEW CHECK IT

36 SYNTHETIC RUBBER FABRIC DRUM. A new 55-gal. synthetic rubber-fabric drum, suitable for shipping liquids, can be collapsed after emptying and is returnable and reusable. The new drum should effect sizable savings in return shipping costs, since more than 2,500 collapsed drums can be shipped in a standard railroad box car that would hold only 300 rigid drums. Experimental tests indicate that the new drum will be suitable for the shipment of oils, greases, fats, acids, paints, emulsions, soaps, dry powders, and a variety of industrial chemicals. It is made of Ustex cord fabric, impregnated with synthetic rubber and molded in one piece. It is equipped with simple, and effective fittings for filling, emptying, lifting, and handling. The new type drum is considered to have safety advantages, since it needs no venting while being filled or emptied. Liquids that oxidize easily can be withheld from exposure to air during removal from the synthetic rubber-fabric drum. Since inner surfaces have no corner pockets, liquid contents can be completely removed and the inside quickly cleaned. *United States Rubber Co.*

IT'S NEW CHECK IT

37 MERCURY ACTUATED DIAL THERMOMETERS. The case is fully compensated for ambient temperatures. The heavy all-glass cover is gasket sealed to the steel back plate. The dial is a nonreflecting white face and is evenly graduated. The tapered stainless-steel bulb is interchangeable with standard industrial thermometer separable sockets. An adapter is furnished to convert from 6 to 3½-in. stem Flexible armor is of 18-8 stainless-steel, ½ in. in diameter. Standard length is 5 ft., maximum length is 60 ft. It is available in rigid-stem, wall-mounted, or flush-mounted models. *Palmer Thermometers, Inc.*

IT'S NEW CHECK IT

38 EXPLOSIONPROOF SOLENOID HOUSING is for use on Ross electrically operated pilot-controlled valves. The cover, which can be used wherever fire and explosion hazards exist, is manufactured of cast aluminum to Underwriters' Laboratory specifications, Class I, Group D, Air Break Type. Provision is made for standard conduit connection. The explosionproof solenoid cover may be used with ¼ to 1¼-in. size Ross pilot operated straight-way, three-way, four-way, and four-way five port models for single solenoid operation. This housing may also be used for double solenoid, momentary operation of Ross base-mounted pilot-controlled valves. *Ross Operating Valve Co.*

IT'S NEW CHECK IT

39 EBONY PAINT is a refined coal-tar base and the bituminous oil and the pigment are alloyed in one homogeneous mass. They are inseparable. When Ebony is applied to metal surfaces, as the solvent evaporates, polymerization occurs, the tar molecules flowing together and forming an unbroken, tough, elastic film. When properly applied the paint carries a 5-year guarantee that it will not crack, blister, peel, or permit rust. Being acid resistant Ebony is especially valuable around industrial plants and on underground applications. *Ebony Paint Manufacturing Co.*

a FLORIDIN DESICCANT

The high-pressure dehydration unit here illustrated is a property of the United Gas Pipe Line Company at Carthage, Texas. It represents the most advanced design, construction, and operating technique; and the drying agent employed is FLORITE DESICCANT. The Stone & Webster Engineering Corporation, who designed and constructed the plant, are users of FLORITE in various types of equipment, large and small, for oil and gas companies and for other branches of industry.

Natural gas, propane, butane, gasoline, air, nitrogen, carbon dioxide, refrigeration compounds, all are treated with superior drying efficiency by use of FLORITE. Selectively adsorbs 4 to 20% its weight of water—is regenerated by heating to 350°F. Write for literature, names of important users in your own field.

FLORIDIN COMPANY

Adsorbents . . . Desiccants . . . Diluents

Dept. C, 220 Liberty St., Warren, Pa.

So Simple

to maintain a BARTON FLOWMETER

— every major source of trouble inherent in other differential-pressure meters has been eliminated. For example:

No liquid seals to lose — your corrosive and highly volatile liquids are handled by stainless steel bellows and range spring assembly, without seal pots. You get lower installation and maintenance costs.

No costly mercury used — hence none is lost by overranging, leakage or theft . . . none to emulsify or react with line fluids. Meter is less bulky. Accurate leveling isn't needed.

Unskilled personnel can put a Barton into operation without harming the instrument in any way, impairing its accuracy or causing expense — because overranging doesn't damage the meter.

Cleaning isn't needed — a Barton drains or vents itself completely. No pockets to trap condensates or sediment. No chains, links or floats to corrode. No doubt about accuracy of reading.

Model 202 Recorder

SIMPLE, TROUBLE-FREE CONSTRUCTION FEATURES:

- **Rupture-Proof Stainless Steel Bellows.**
- **Torque-Tube Drive — no pressure bearing.**
- **Self-Draining Housings.**
- **Pulsation Dampener, Adjustable Externally.**
- **Low Displacement — less than .075 cu. in. for 5% of scale travel.**

Model 200 Indicator

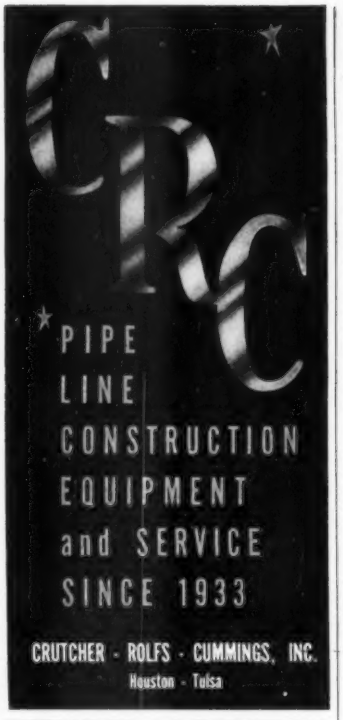
for measuring

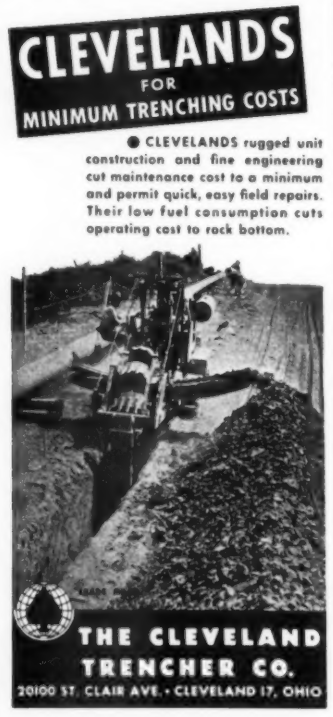
FLOW • LIQUID LEVEL • DIFFERENTIAL PRESSURE

WRITE FOR DETAILS IN BULLETIN 11C4

BARTON INSTRUMENT CORPORATION

1433 SO. EASTERN AVE., LOS ANGELES 22, CALIF.




CLEVELANDS
FOR
MINIMUM TRENCHING COSTS
● CLEVELANDS rugged unit construction and fine engineering cut maintenance cost to a minimum and permit quick, easy field repairs. Their low fuel consumption cuts operating cost to rock bottom.
THE CLEVELAND TRENCHER CO.
20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO

PIPE LINES

New Cities Service Facilities

WASHINGTON.—Cities Service Gas Co., Oklahoma City, has been authorized by the Federal Power Commission to construct more than $5,000,000 in new natural-gas pipe line facilities in Kansas, Oklahoma, and Missouri.

The company plans to install 13,080 hp. in compressors at new and existing stations on its system, and to build approximately 56 miles of 16, 10¾, and 3-in. lines in Sedgwick, Harvey, and Labette counties, Kansas.

Three 1,600-hp. units will be installed at the existing Hugoton station in Grant County, Kansas. The company will also build three new stations—a 6,400-hp. unit near Greensburg, Kans.; a 1,200-hp. unit near Welch, Okla.; and 680-hp. station near Pierce City, Mo.

New capacity at Hugoton and Greensburg stations will enable the company to increase capacity of its Hugoton-Kansas City, Mo., line and avoid curtailments in supplies of gas to Kansas City industries during the coming heating season.

Installation of the other compressor units will increase capacity of the Caney, Kans. - Springfield, Mo., system from 46,400,000 to 52,830,000 cu. ft. per day.

The new pipe-line construction will increase supplies of gas in the Wichita-Newton-Hutchinson area in Kansas.

Cities Service was also authorized to abandon about 192 miles of 2 to 12-in. lines in Reno, Sedgwick, Wilson, Harvey, Kingman, and Labette counties, Kansas.

Crude-Line Revenue Up

WASHINGTON.—Transportation revenue of 51 large oil pipe line companies for the first quarter of this year showed an increase of 26.5 per cent over the same period in 1950, according to the Interstate Commerce Commission.

The total revenue of the companies was $115,137,360 for the quarter, compared with $91,043,251 last year. Increases ranging from 2.7 to 164.6 per cent were reported by 43 companies; 8 others reported decreases ranging from 0.3 to 17.1 per cent.

The ICC figures showed that 735,506,673 bbl. of oil were originated on line and received from connections by the 51 companies, against 584,348,644 bbl. during the first quarter of 1950.

Service Pipe Line Co., Humble Pipe Line Co., and Sinclair Pipe Line Co., respectively, led the list in transportation revenue with receipts totaling $12,734,671, $10,450,958, and $9,039,283.

Humble was at the top of the heap in number of barrels of oil originated on line and received from connections with 72,349,591. Texas Pipe Line Co. and Interstate Oil Pipe Line Co. ranked second and third with 46,951,425 and 42,444,591 bbl. respectively.

Atlantic Gulf Line Doubtful

WASHINGTON.—Realization of Atlantic Gulf Gas Co.'s plans to build a 1,700 mile natural-gas pipe line to the Southeast appeared doubtful after the company told the Federal Power Commission last week that it had not been able to get enough signed sales contracts to finance the line.

Atlantic said the line could not be built as designed due to the failure of enough industrial users to contract for gas, rather than failure of communities to do so.

Hearings now going on before FPC were recessed on request of a representative of the Georgia Public Service Commission.

Scott Wilkinson, attorney for Atlantic, said the firm believed that the proposed line could be redesigned on a smaller scale to serve users who have signed contracts, but that this would require new estimates, engineering plans, and economic studies.

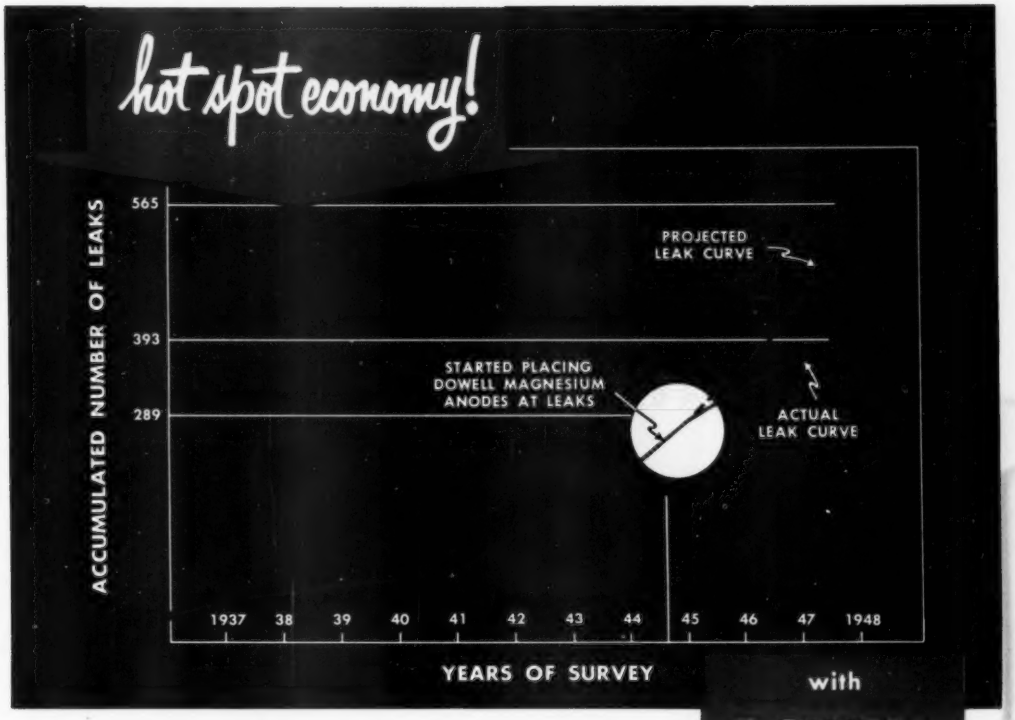
United Laterals O. K.'d

WASHINGTON.—United Gas Pipe Line Co. received temporary authorization from Federal Power Commission to proceed with the construction of about 50 miles of pipe line in southeastern Alabama and northwestern Florida.

The construction program includes about 39 miles of 16-in. loop paralleling United's existing Pensacola lateral in Baldwin County, Alabama, and Escambia County, Florida. A 5.8-mile line will be built paralleling the company's existing Gulf Power Co. lateral in Escambia County, and a 5-mile line will be laid to the naval air station at Saufley Field.

Pipe-Line Briefs

Shell Pipe Line Corp. plans to lay an 8-in. crude outlet from Gohlke field, DeWitt County, Texas, to Shell Oil Co.'s refinery at Houston, according to T. E. Swigart, president. The line will handle crude from Gohlke field and other fields in the immediate area. Current production in the general area, now under active development, totals about 2,000 bbl. per day.



with

DOWELL MAGNESIUM ANODES

How a pipeline company cut anticipated leak rate 62%

172 future corrosion leaks prevented by installation of Dowell magnesium anodes! As shown in the graph above, that's the estimated number of new leaks prevented in a 3½ year period on a 12-inch bare Dresser-coupled line with 28 corrosive areas.

Such cathodic protection is economical as well as effective. This company installed anodes at each leak point when leaks were repaired. *The total cost of the anode installation was more than off-set by the maintenance savings* resulting from the reduction in the rate of new leaks.

Sizeable reductions in the number of new corrosion leaks are common when Dowell magnesium anodes are installed. The protection obtained in a particular soil is governed by the number of anodes used.

Dowell magnesium anodes require no external power or maintenance. In addition to oil and gas pipelines, they have proved valuable in controlling corrosion of municipal gas and water lines, storage tank bottoms, and many other underground and underwater installations. Write to Tulsa, Dept. 17, for free booklet and more information.

DOWELL INCORPORATED • TULSA 3, OKLAHOMA
OFFICES IN PRINCIPAL CITIES

DOWELL

MAGNESIUM ANODES

GALVO-PAK® • GALVO-LINE

SUBSIDIARY OF THE DOW CHEMICAL COMPANY

Look to **DOWELL**

MAGNESIUM ANODES FOR CORROSION CONTROL

"Everything for the Pipeliner"

PIPE COATING and WRAPPING MACHINES
Stationary and Line Traveling

PIPE CLEANING and PRIMING MACHINES
Stationary and Line Traveling

American Steel Works
HEATING KETTLES

PIPE LINE SUPPLIES AND EQUIPMENT

PERRAULT Brothers
1130 NORTH BOSTON
TULSA 6, OKLAHOMA
Phone 5-1104

DEPUTY OFFICE 30 ROCKEFELLER PLAZA
PHONE CIRCLE 6-8260 • NEW YORK 20, N. Y.

PENBERTHY
EJECTORS

Use the power of steam, air or water under pressure to lift liquids. Being simple jet pumps they have no moving parts and require no lubrication. A variety of models to meet different conditions. Also used as water heaters.

PENBERTHY INJECTOR CO.
DETROIT, MICH.
Canadian Plant WINDSOR, ONTARIO

Houston Contracting Co.

HOUSTON CONTRACTING CO. is a partnership of Laurence H. Favrot and R. P. Gregory. The firm is served in an advisory capacity by G. A. Peterkin, consultant. This partnership was formed late last year when the predecessor, Latex Construction Co., was liquidated. Favrot is president of the Pipe Line Contractors Association.

L. H. FAVROT

History.—The construction organization of Houston Contracting Co. continues operations which may be traced back through various firms identified with Favrot and Peterkin for over 20 years.

While Latex is the best known of the predecessor firms, the activities of the associates originally started in 1932 with Apex Construction Co. which was operated by Favrot and Peterkin for Williams Brothers, following 7 years' construction service of these two men in the latter organization.

The formation of Latex Construction Co. on January 1, 1937, and the discontinuance of Apex marked the beginning of completely independent operations of Favrot and Peterkin.

G. A. PETERKIN

R. P. GREGORY

In 1942 the two associates volunteered for military service. Favrot directed Army pipe-line construction for a year in North Africa and for 2 years in the India-Burma-China sector. Peterkin served for 2½ years in the Air Force in the United States.

R. P. Gregory, partner in Houston Contracting Co., came to Latex in 1941 from 9 years' service with Texas Pipe Line Co. He was called from the reserves to service in field artil-

McCORD
CLASS S.F. LUBRICATORS
The "SF" Lubricator provides close and accurate feed adjustments with a degree of reliability that has made it the preferred lubricator in the oil field. The advantages of easy removal of pump units, welded steel tanks, the wide variety of drives, and the new type graduated oil level gauge are outstanding McCord features. Prompt deliveries.
McCORD CORPORATION
Detroit 11, Mich.
The result of over 50 Years Lubricator Building Experience

POSITIVE OIL SHOW IDENTIFICATION
with MINERALIGHT Ultra-Violet (black light)
Don't pass up possible pay! Make positive core identification checks with new model MINERALIGHT SL long wave ultra-violet lamp.
PROVED BEST BY TEST FOR OIL SHOW ANALYSIS! Simple to operate. Lamp weighs only 1 lb. Models available for 110 volt AC or with adapter, 110 volt DC current. Battery operated model for field use holds lamp, has built-in viewer for daylight examination. Easily portable. Send for FREE brochure OG, "How to detect and analyze petroleum in oil surface samples with ultra-violet".
ULTRA-VIOLET PRODUCTS, Inc.
145 Pasadena Avenue, South Pasadena, Calif.

EXCEL-SO
CALIBRATING TANKS
for displacement meters.
Any capacity — Any Specification.
Write For Bulletin
WARNER LEWIS COMPANY
P. O. BOX 3096-A • TULSA, OKLA.

1000 MILE *Mid-Century Miracle* THE MID-VALLEY PIPELINE

With 29 HEAT TRANSFER UNITS By WESTERN

From Longview, Texas, to Lima, Ohio — a $56,000,000 interstate common carrier that spans 1,000 miles and touches six states — that's the Mid-Valley pipe line.

And at all diesel and dual fuel pumping stations you will find Western heat transfer equipment. These units are "Tailorized" to fit into Mid-Valley's master plan of "optimum economy of operation with the lowest capital investments consistent with sound long-range planning."

Western's engineering cooperation with Mid-Valley design engineers led to the overall installation of twenty-nine 24-inch Fixed Tube Sheet exchangers of the single shell pass and single tube pass type. The original 10 units are, even now, satisfactorily serving their purpose in supplying much-needed crude to the expanded refining facilities of the Ohio area. Check your operational and maintenance records now, and for "Tailorized" heat transfer equipment consult with Western. Full reports on our operational methods and facilities will gladly be sent upon request.

WESTERN
HEAT EXCHANGERS

Manufactured by
WESTERN SUPPLY COMPANY
P.O. BOX 1888 TULSA, OKLAHOMA
SALES OFFICES — DALLAS — HOUSTON

AGAIN WE SAY—

"FLEXIBLE" TOOLS SPEED PIPE CLEANING

We clean all types of pipe . . . steel, cast iron, Transite, clay, wood stave . . . from 2" up to 12 feet in diameter.

Specially designed air-operated pipe cutter saves time on the job.

Tools, methods and long experience blend in Flexible pipe cleaning service to give fast results at low cost.

"Flexible" hydraulic pressure line scraper cleans scale from lines in record time.

Badly scaled pipe lines respond to "Flexible" treatment — direct, fast, efficient treatment.

Write or Wire Today for an Estimate on cleaning your water, gas or oil line or stacked pipe. Industrial waste lines & sewers cleaned as well.

FLEXIBLE PIPE CLEANING CO.
OF CALIFORNIA

Shop and Warehouse: 9324 Norwalk Blvd. Los Nietos, Calif. Phone OX: 4-4108 or call TExas 0-2159.
9059 Venice Blvd., Los Angeles 34, Calif.

lery in France, Belgium, and Germany.

Their business was conducted during the war by the partnership of Sharman & Allen (J. W. Sharman and Earl Allen, employes of Latex prior to wartime suspension of Latex operations) which functioned until Favrot and Peterkin returned to Houston in 1945.

Then the firm of Associated Contractors & Engineers was organized by Favrot, Peterkin, Sharman, Allen, and A. L. Forbes. It operated until March 1946 when Favrot, Peterkin, and Sharman withdrew to reactivate Latex Construction Co. which continued operations until its liquidation and the formation of Houston Contracting Co. in November 1950.

Operations. — The Favrot - Peterkin organizations have handled the largest amount of pipe-line construction in swamps, marshes, and open water crossings on the Gulf Coast. They have concentrated their operations in the South and have seldom gone north of Georgia, Tennessee, and Oklahoma. Houston Contracting Co. is prepared for laying long offshore lines which are in prospect for construction on the Continental Shelf.

Construction record.—Altogether approximately 10,483 miles have been laid by the firms identified with Favrot and Peterkin activities, including 7,928 miles by Latex and 2,555 miles by Sharman & Allen and Associated Contractors & Engineers.

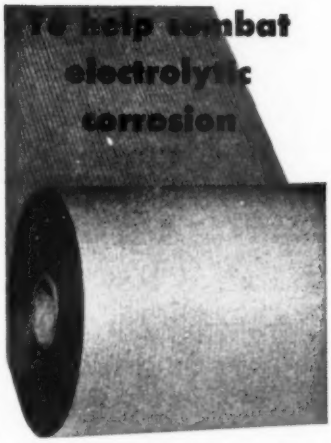
Improvements.—Advancement of new equipment has been furthered by the organization. The first smooth-bending machine was financed, developed, and field-tested for a year. Numerous improvements have also been devised for pipe laying in swamps, marshes, and on land.

Projects.—Recent laying operations of Houston Contracting Co. includes the following: Trunkline Gas Co.'s 230-mile, 26-in.; Tennessee Gas Transmission Co., 350 miles of various sizes including a 25-mile, 12-in. line in Louisiana marshes in the Grand Chenier area; and Dow Chemical Co. lateral lines near Freeport, Tex. For Sun Pipe Line Co. 22 miles of 6-in. has been taken up and reconditioned near Monroe, La.

Personnel.—Paul Dakin is general office manager. The six spread superintendents include Earl Norris, W. H. (Snake) Hayes, F. A. (Mazoo) Silar, Harvey Leake, J. A. (Fat) Cantrell, and H. E. (Pat) Murphy. The warehouseman is Ed Eis.

Equipment.—The company has six fully equipped spreads. These include three for handling pipe as large as 30-in., one spread for 20-in., and two river-crossing spreads.

Headquarters.—Company operations are based at Houston, where the main office is at 2707 Ferndale Place and the warehouse is at 2902 West Eleventh Street. Latex Construction Co. of Georgia, an affiliated firm managed by W. E. Honey, president, has headquarters in Atlanta.



Reinforce your pipe coatings

with Vitron

UNDERGROUND PIPE WRAP

An outstanding reinforcement that has helped form high-dielectric coatings on thousands of miles of pipelines, Vitron Underground Pipe Wrap gives you these time-saving, cost-saving advantages—

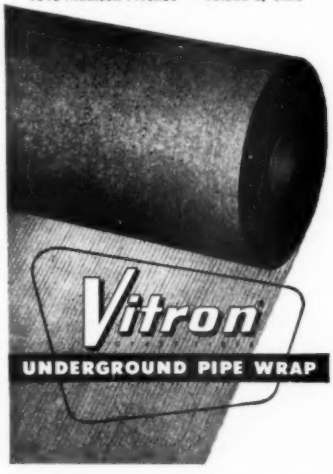
Higher Coating and Wrapping Speeds. VITRON Underground Pipe Wrap is extra-reinforced with parallel strands of high strength glass yarn.

Fewer Holidays. Uniform porosity gives even bleed-through of coating compound, allows holiday-forming gases to escape.

Greater Permanence. VITRON Underground Pipe Wrap will not rot or weaken under fungus or bacterial attack. It resists soil acids, absorbs no moisture.

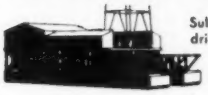
Write for samples and descriptive engineering material.

GLASS FIBERS INC.
1810 Madison Avenue • Toledo 2, Ohio



Levingston

BUILDS FINE SPECIALIZED MARINE EQUIPMENT FOR THE PETROLEUM INDUSTRY

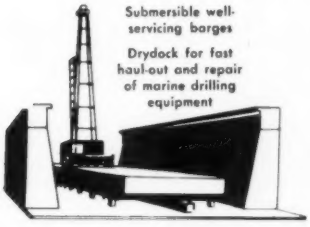


Submersible drill barges

Tugs

Boiler and compressor barges

Water, oil, and supply barges



Submersible well-servicing barges

Drydock for fast haul-out and repair of marine drilling equipment

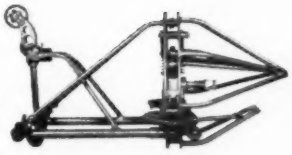
Levingston is not only located conveniently with respect to marine drilling operations on the Gulf Coast, but here you will find marine engineers and constructors who understand the language of oil operators. Bring your marine petroleum equipment problems to Levingston *first* for a quick economical solution.

Levingston

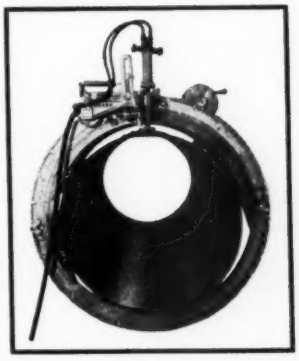
SHIPBUILDING CO.

Orange, Texas

CROSE INTERNAL LINEUP CLAMP



CROSE INTERNAL LINEUP CLAMPS are available in manual, electric and hydraulic models for pipe sizes ranging from 12" to 36". Crose Internal Lineup Clamps have been proven in world-wide field operations.



CROSE PIPE CUTTING AND BEVELING MACHINE for fast true cutting and beveling of pipe. Available in six sizes for 4" to 36" pipe. All machines are built of high strength, light weight aluminum alloys. The continuous ring which goes around the pipe is hinged so that these machines may be installed as easily from the side of the pipe as from the end. Machines for 16" pipe and above have "Out-of-Round" attachment as standard equipment.

M. J. CROSE

MANUFACTURING COMPANY, INC.

2715 Dawson Road TULSA, OKLA. Phone 6-2173

HENRY H. PARIS DISTRIBUTOR Inc.

Manufacturer's Agent - Oil Well and Refinery Supplies

P. O. BOX 932 1125 ROTHWELL ST.

HOUSTON, TEXAS

VOLCANO SUPERIOR GAS BURNERS

These burners derive their higher efficiency and longer life from such features as: All-steel construction; Burner heads with double barrel shank and double mixer are equivalent to two ordinary burner heads; Slight H-shape of head assures more perfect combustion by proper circulation of secondary air; series of heads on triple manifold covers approximately entire firebox area. For superior efficiency, specify Volcano Superior Gas Burners.

Agent and Distributor for the following Nationally known Manufacturers

W. C. NORRIS MANUFACTURER, INC.
Tulsa, Oklahoma
Quality Pumping Equipment, Swage Nipples, Bull Plugs, Welding Fittings, etc.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS

THE OHIO INJECTOR COMPANY
Wadsworth, Ohio
OIC VALVES, Bronze, Iron, Cast and Forged Steel for all purposes.

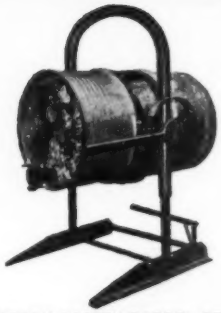
HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types Oil COUNTRY BOILERS

DRESSER MANUFACTURING DIV
Bradford, Pa.
Seamless Welding Fittings

WESTERN SAFETY BARREL STAND STEEL FORGING, Inc.
Shreveport, La.
Weld Saddles



WESTERN SAFETY BARREL STAND

Holds 50 to 55 gallon barrels in flexible steel band between steel U frame which tilts forward to pick up barrel from floor. Barrel can be latched in vertical, horizontal or 45 deg. positions by means of a tilting lever which operates flexible band. Barrel can be revolved in stand. Prevents spillage.

PUMPS

CENTRIFUGAL
RECIPROCATING

BUILDERS OF OUTSTANDING PUMPS
Since 1869

ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

323 W. TENTH ST.

NORRIS BROTHERS *Quality*

● Is the result of over 50 years' know-how and three generations of faithful service to the pumping equipment needs of the American oil producers.

No influence could cause us to change the principles that have made our products famous and have won us our great reputation for

Value Giving

DAN NORRIS — *Design ● Precision Production*

PAUL NORRIS — *Engineering ● Purchasing Sales*

Norris Brothers, INC.

ROBINSON · ILLINOIS

NATURAL GAS

Columbia to Expand Storage

NEW YORK.—Columbia Gas System, Inc., will allot a major part of its $50,000,000 construction budget for 1951 for development of underground gas-storage projects.

Part of the steel for storage construction is already on hand, according to Stuart M. Crocker, chairman of the board, and George S. Young, president.

During 1950, Columbia spent $7,928,000 for construction of underground-storage facilities. By November 1, the company had 128 billion cubic feet of gas in storage, and 106 billion remaining at the end of the year. Approximately 79 billion cubic feet was still in storage at the end of the last heating season.

In a single day last year, Columbia took 842 million cubic feet out of storage wells scattered throughout West Virginia, Kentucky, Ohio, Pennsylvania, and New York. The company spent about $5,000,000 for new producing wells during the year.

Growth of Columbia's underground-storage system has taken place principally during the last 4 years. At the end of 1947 the company had only about 40 billion cubic feet in storage as compared with the 106 billion at the same time last year.

Carbon-Black Sales Up

WASHINGTON. — Both sales and production of carbon black registered big gains in 1950, the Bureau of Mines reported last week.

Total sales in the United States increased 34 per cent to 1,508,639,000 lb., and production totaled 1,381,991,000 lb., a 13 per cent increase. Production of furnace black increased 28 per cent to 765,226,000 lb. while contact-black production declined 2 per cent to 616,765,000 lb.

The quantity of natural gas used in production of carbon blacks was about 410 billion cubic feet. Liquid hydrocarbons used amounted to more than 2,500,000 bbl.

Total production of carbon black during the year was valued at $84,604,000 at plants.

All classes of consumers used increasing quantities of blacks. The rubber industry increased its consumption 264,000,000 lb. to well over a billion pounds. The ink and paint industries increased their usage 59 per cent. Exports were up 32 per cent.

Stocks of both blacks declined sharply. By December 31, only a 36 days' supply of contact black and a 10 days' supply of furnace blacks remained.

Ammonia From Gas Endorsed

KANSAS CITY. — A method for producing ammonia gas from steam and natural gas which is cheaper than production from coke or coal was outlined last week by H. A. Tuttle, Chemical Construction Corp., at the Midwest meeting of the American Institute of Chemical Engineers.

Recently a trend toward production of hydrogen from hydrocarbon gases for use as ammonia raw material has been taking place. The reason for this is purely economic, Tuttle said.

To produce enough hydrogen for one short ton of ammonia requires about 35,000,000 B.t.u. The amount of raw material needed to produce this much energy is 10,450 kw.-hr. using the electrolytic process, 1.4 tons of average coke, or 35,000 cu. ft. of natural gas, he said.

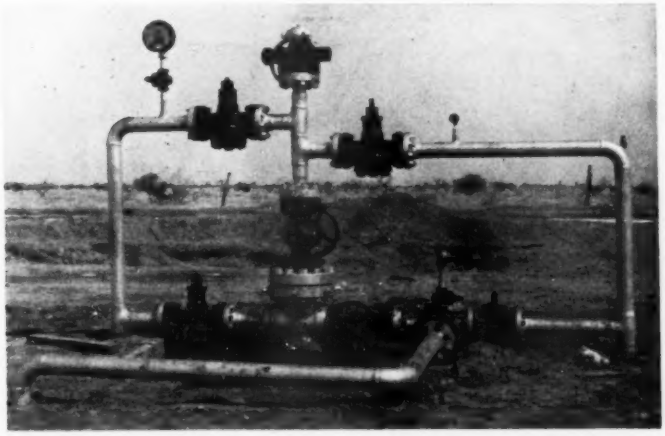
With natural gas selling at 20 cents per M.c.f., electricity would have to cost 7/10 mill per kw.-hr. and coke $5 per ton to be in competition.

Tuttle predicted that hydrocarbon gases are going to play a steadily increasing role in supplying source material for ammonia synthesis for as long as they are available.

More Gas-Heated Homes

NEW YORK. — Nearly a million homes will install gas-heating facilities during the 1951-52 heating season, according to a survey recently completed by the American Gas Association.

Another 900,000 new house-heating customers are anticipated during the 1952-53 season. The survey indicates that about 9,000,000 dwelling units were using gas for all house-heating purposes on January 1, 1951.



***PROPANE UNDERGROUND.**—This photo shows the hook-up on a propane injection well used by Texas Natural Gasoline Co. in connection with its underground storage of propane in a salt reservoir in Benedum field, Texas. (Details of this project appeared in The Oil and Gas Journal, April 19, page 167.)*

Natural Gasoline

Plant Nears Completion

BARTLESVILLE. — Phillips Petroleum Co. will begin operations in June of its Bayou natural-gasoline plant in Brazoria County, Texas.

The new plant will process up to 175,000,000 cu. ft. of gas per day from Chocolate Bayou field, and will produce approximately 150,000 gal. per day of natural-gasoline products.

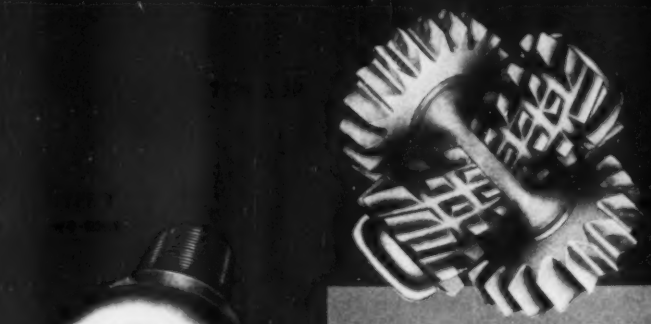
Gas will be gathered by a dual gathering system from both oil and distillate wells at both high and low pressures.

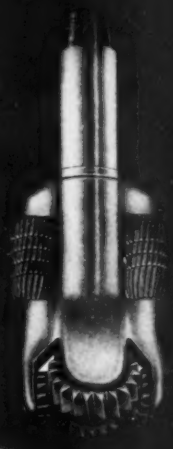
The plant has been under construction for the past 8 months. Phillips recently announced that it is engaged in securing pipe-line rights-of-way in Midland and Glasscock counties, Texas, before starting construction of a new natural-gasoline plant to serve the Tex Harvey, Germania, and Driver areas. *(The Oil and Gas Journal, May 17, page 157.)*

Hugoton Plant Readied

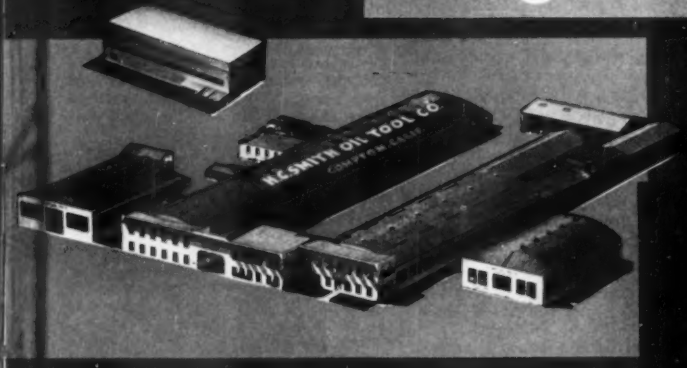
ULYSSES, Kans.—Hugoton Production Co.'s new million-dollar natural-gasoline plant 8 miles south of here is nearing completion.

The plant will be capable of processing 65,000,000 cu. ft. of natural gas per day, and will extract natural gasoline, butane, and propane. Nine large storage tanks will provide storage for more than 100,000 gal. of each product.





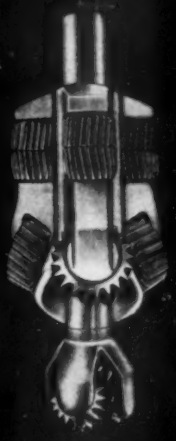
H.C. SMITH ROCK BITS



H C Smith OIL TOOL CO.

GENERAL OFFICES, EXPORT OFFICE AND PLANT
COMPTON, CALIFORNIA

H.C. SMITH HOLE OPENERS



Among the Drilling Contractors

Big Chief Undertakes Five-Well New Mexico Job

Big Chief Drilling Co., Oklahoma City, has a contract with Paul Stock, independent operator, Cody, Wyo., for a five-well drilling program in the Pebble Creek area, San Juan County, northwestern New Mexico. Location already has been made for the first test, 1 Government-Allridge, located in C SE SE 10-23n-11w. Rig is being moved in. Four tests, including the one starting, are projected to the Pictured Cliffs horizon. The fifth, to be started later this year, will be a Dakota sand test.

Newton Contracts Six Wells

Newton Drilling Co., Coalinga, Calif., has contracted with Victory Oil Co. for six wells to be drilled in the Cymric field, Kern County, California. Work is under way on the first test.

Folk Drilling Co., Yukon, Okla., is the contractor on a wildcat test which Lindas Oil Co. is drilling at 1 Lawson, in the SW SE NW 24-20n-5e, Payne County, Oklahoma.

Miller & York, Bakersfield, Calif., have contracted for another wildcat test which Caneros Oil Co. will drill in the Cymric-Salt Creek area, Kern County, California. Latest operation is 2-2 Anderson, in 19-29s-21e.

Loffland Brothers Co., Tulsa, is starting a projected 9,500-ft. test for Phillips Petroleum Co. at a wildcat location 2½ miles west of Roosevelt, Uintah County, Utah. Location is on the Leeton lease in the C NE NE 24-1e-1w.

McConnell Drilling Corp., Farmington, N. M., has the contract for the deep test which Shell Oil Co. has projected for the west side of the Willston basin in northern Dawson County, Montana. Contract is for 11,000 ft., and heavy rotary equipment is being set up. The well is 1 Northern Pacific with location in the C NW NW 19-23n-50e. It is 55 miles northwest of Glendive.

Fleet Drilling Co., Ada, Okla., has taken contracts for an 11,750-ft. test in the Chitwood field, Grady County, Oklahoma, and an 8,000-ft. test located north of the Palacine producing area in Stephens County, Oklahoma. The first test will be for Midstates Oil Corp. at 1 Drummond, SW SW NE 34-5n-6w. The Stephens County test will be for Seaboard Oil Co. at 1 Hurst, SW SW NW 28-1s-6w.

E. K. Carey Drilling Co., Inc., Denver, has rig working for Fredericks and associates on wildcat test 1½ miles southwest of the Smolan pool, Saline County, Kansas. Operation is 1 Erickson, NE NE NE 35-15-4.

Gardner Brothers Drilling Co., Inc., Dallas

GARDNER BROTHERS Drilling Co., Inc., is one of the larger and oldest firms in contract drilling. It had its inception in the early twenties as a partnership operating, as Gardner Brothers & Collins. Later, this partnership was reorganized under the name of Gardner Brothers. The present incorporation was formed in 1946 following the death of Craig Gardner, one of the original owners.

MILTON PRICE

J. ALVIN GARDNER

Main offices.—Headquarters of the company were in Wichita Falls, Tex., until after the opening of the East Texas field, at which time an additional office was opened in Dallas. The Wichita Falls office was maintained until 1933 to handle the company's drilling operations in the Borger and Pampa field. After that it was consolidated with the Dallas office, which continues as the headquarters.

Officers.—J. Alvin Gardner, one of the original partners and organizers of the company, is president. He has worked in and around oil fields since the early days of the Spindletop field at Beaumont, Tex., where he got his

tops in the oil country

Prevents pipe threads from galling and seizing—protects threads—lengthens life of drill string. Those are reasons why 'Bestolife Lead Seal Tool Joint and Casing Compound has been tops in the oil country for 20 years. Unconditionally guaranteed. Sold and exported by supply houses the world over.

I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

IN STOCK AT
Wood's
DALLAS
WAREHOUSE

SHEAVES • PULLEYS • HANGERS • PILLOW BLOCKS (Plain, Babbitted and Ball Bearing) • COUPLINGS (Flexible, Flanged and Compression Types) COLLARS • "SURE-GRIP" SHEAVES AND PULLEYS • "SURE-GRIP" INDUSTRIAL V-BELT • "SURE-GRIP" FHP SHEAVES AND V-BELTS • COMPLETE DRIVES.
Write for detailed information.

T. B. WOOD'S SONS COMPANY
1117 W. COMMERCE ST., DALLAS, TEXAS
Main Office & Factory: Chambersburg, Pa.
Branches: Boston, Mass., Newark, N.J., Cleveland, O.

Wherever the world-wide search for oil might take your drilling operations, make Christensen Diamond Products your standard guide for dependable Diamond Drill Equipment.

The design, engineering and manufacture of all Christensen Diamond Products are performed by experts with long experience in these fields.

Christensen Diamond Bits mean Top Performance . . . you can expect added footage, greater efficiency in operation and maximum recovery of diamonds for resetting.

CHRISTENSEN
DIAMOND PRODUCTS CO.
1937 SOUTH SECOND WEST
SALT LAKE CITY, UTAH

first oil-industry job. This job was with what is now the Gulf Oil Corp. He was 16 years old at the time. He continued with that company through the Ranger, Burkburnett and Northwest Extension drilling plays, at which time has was superintendent of Gulf's North Texas division.

J. Macon Gardner (son of J. Alvin), is vice president and drilling superintendent. Milton Price is secretary-treasurer and office manager.

Drilling rigs.—The company started with only cable tools. Currently, in addition to cable tools, it is operating 18 rotary rigs, including large and small, power and steam assemblies, and is prepared to handle any type of drilling.

Operations.—After its work in the East Texas field began to level off and subside, the company for a number of years turned its attention largely to West Texas and Southeastern New Mexico, where it operated out of Kermit. As the Permian basin developed, it opened offices in Odessa, which now is a center for the company's operations in that region, with toolpusher camps being maintained at Hobbs, N. M., and Odessa and Kermit, Tex., and a scout at Midland. The company had rigs running in Illinois during the time of that state's rapid rise and decline of oil development. During the past 8 years, its operations, in addition to those in the Permian basin area of West Texas and New Mexico, have been in Southwest Texas, the Rangely field in northwestern Colorado and the adjacent Ashley Valley area of Utah. Present drilling includes two rigs in the San Juan basin of northwestern New Mexico.

Key personnel. — Toolpushers include Paul Cunningham, who has been with the company more than 25 years; T. W. Clark, D. A. Budge, and W. R. Harrington, all of Odessa; J. C. Goode, Farmington, N. M.; L. O. Riley and H. W. Kiser, New Mexico area; and D. S. Kirklin, Abilene, Tex. M. H. Trout is representative at Midland.

Miscellaneous.—In addition to directing activities of his company, J. Alvin Gardner, the president, finds time for his hobby of baseball. He is a former owner of the Wichita Falls club, and for the past 20 years has held the presidency of the Texas Baseball League.

Dirickson-Lewis Drilling Co., Tulsa, is drilling on a 4,600-ft. contracted hole for D & L Oil Co. at 1 Bamberger, 2½ miles east of Perry, in the SE SE SE 18-21n-1e, Noble County, Oklahoma.

Trigg Drilling Co., Oklahoma City, is moving a rig to a wildcat location 5 miles south of Duncan, in Stephens County, where it has a contract with C. L. Carlock, also of Oklahoma City, for a test to be drilled to the Arbuckle lime, or 5,500 ft. Location is for 1 Branch, SE NW NW 31-1s-7w.

L-O-N-G-E-R
THREAD LIFE

1. EXCLUSIVE 500-TON SPECIAL prevents washouts and galling. Makes breaking out easier; withstands highest pressures, and is unaffected by heat and moisture!
2. KANT-GALL TOOL JOINT COMPOUND
3. LONG-LIFE DRILL COLLAR COMPOUND

SOLD BY SUPPLY STORES EVERYWHERE

PETROLEUM DISTRIBUTING CO.
BOX 203—HOUSTON, TEXAS
CHarter 5648

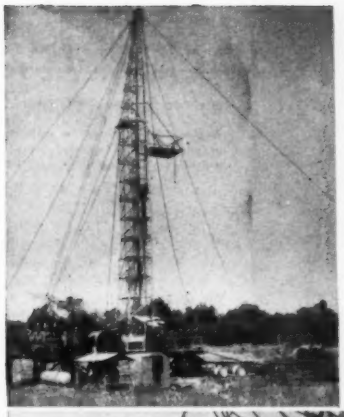
Standco
NO-SMOKE
STANDCO BRAKE LINING

Nothing novel—no bunk, but it gets the job done without scoring brake rims. See pages 3608-3613, Composite Catalog.

Standco Brake Lining Co.
HOUSTON

PETROLEUM INDUSTRY
TAX AND COURT SERVICE

This proven, informative bulletin brings you current developments in the fields of Federal Taxes and court decisions affecting the petroleum industry.
This is a comprehensive service reporting all important decisions, etc., affecting Federal Income, Social Security and other Federal taxes, and the decisions of all state appellate courts and all Federal courts in the United States which are of particular significance to the industry.
Issued twice a month—Cost only $7.50 per year
SAMPLE ON REQUEST
PETROLEUM INDUSTRY
TAX AND COURT SERVICE
P. O. Box 447 Houston, Texas

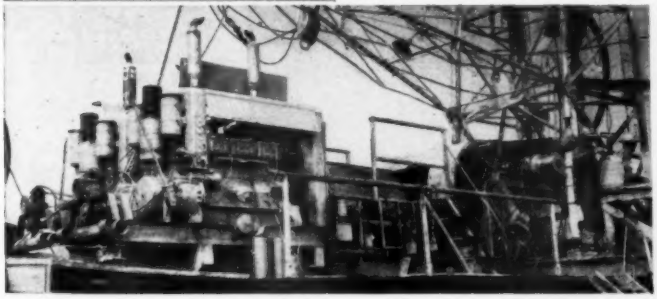


Beene-Hurley Use Low Cost Power on Frank's Rig!

Drillers Beene and Hurley at Bossier City, La., use Frank's portable rig with four Minneapolis-Moline 1210-12A units for power. They are drilling low-cost wells to depths of 6500 feet. The 1210-12A, 12 cylinder unit engines are factory equipped to operate on LP gas or natural gas—the low priced fuels in this area.

Beene and Hurley have mounted two of these units on the drilling table to furnish power to the draw works. These engines are equipped with front power take-off drives and supply 400 hp with LP gas. The other 1210-12A units are remotely located on the mud pump. The complete engineering and installation was done by Beene and Hurley at Shreveport.

Mud pump installation is powered by two MM 1210-12A's.



Two MM 1210-12 on the drilling table operate on low-cost, higher octane LP gas.

This arrangement combines flexibility of layout with important time saving for setting up the rig. Precision tooling and high production methods account for the extremely low selling price of MM heavy-duty oil field power units. Standardization of parts permits interchangeability which assures easier, lower-cost maintenance.

Sales and service of MM oil field engines are handled by the Shrimpton Manufacturing and Supply Co., with branches at Los Angeles, California; Oklahoma City, Oklahoma; and Kilgore, Texas.

JENSEN has 30 years experience

There are no "bugs" in a Jensen. Thirty years of proven field service have long since worked them out.

The Jensen Pumping Unit you buy is a simple, rugged, well engineered and efficient oil lifting machine. It will assure you reduced operating costs and greater profits.

Find out how a Jensen will fit in your production picture. See your Jensen dealer or write for complete specifications.

JENSEN Bros. Mfg. Co.

Coffeyville, Kansas, U. S. A.

Export Office: 50 CHURCH STREET, NEW YORK CITY

TAC does what no other tool can do!

AT LAST! AN OPEN-END RATCHET WRENCH — the world's first true *universal* wrench. A patented design for connections on tubing, rods, piping, conduit, studs, etc. Sixty-four socket sizes from ⅜" to 4". Smallest effective ratcheting arc yet — 5° to 7½°. TAC will also do every job any ordinary ratchet wrench will do: one TAC set replaces literally dozens of single-purpose hand tools.

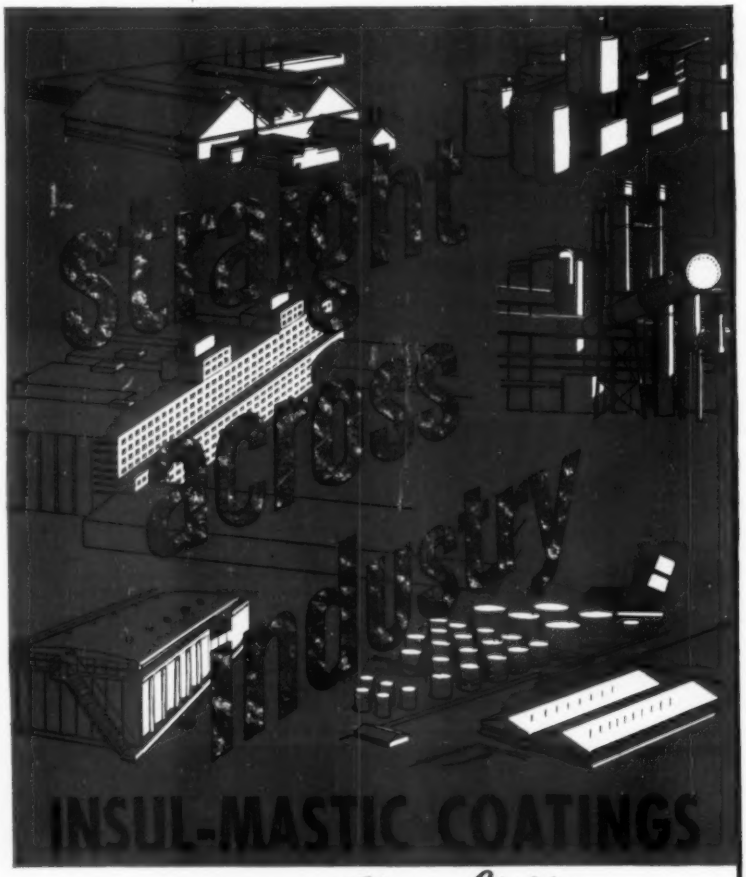
makers of advanced tools for industry

TAC

TAC is the registered trademark of

TUBING APPLIANCE CO.

7112 South Victoria • 10321 Anza Ave. • Los Angeles, Calif.



SIGNIFY *Simplicity*

Insul-Mastic is the simple, practical coating for corrosion prevention, insulation, moisture and vaporsealing. Here is *lasting* protection without complicated or multi-coat application methods. One coat quickly sprayed onto a clean dry surface gives you a heavy barrier against weather and chemical attack. Insul-Mastic's simplicity means economy for you.

Insul-Mastic is top quality protection against acids, alkalis, moisture-vapor and other corrosive agents. Masonry and insulation can also be protected from moisture by this Insul-Mastic seal. Insul-Mastic Type "D" offers thermal insulation (−40° to 300° F.) as well as protection.

Write for complete information and the name of our nearest representative.

Think first of the coatings that last!

NO SPECIAL PREPARATION

A clean dry surface—a primer maybe—but no special preparation for Insul-Mastic.

NO MIXING

Insul-Mastic is homogenized. Solvents don't separate from the coating.

NO HEATING

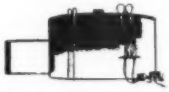
Insul-Mastic coatings are sprayed just as they come from the drums.

SPRAY APPLICATION

No specialized application methods are needed for Insul-Mastic coatings.

NO HARM TO WORKMEN

Fumes do not burn eyes or skin.



ONE COAT APPLICATION

One coat of Insul-Mastic is sufficient for lasting protection.

NO SPECIAL CURING METHODS NEEDED

Spray Insul-Mastic and leave it.

Insul-Mastic Corporation
OF AMERICA
1158 OLIVER BUILDING · PITTSBURGH 22, PA.
Representatives in Principal Cities

REFINING

Pipe Still on Stream Soon

BAYTOWN, Tex. — A 70,000-bbl. pipe still now under construction at Humble Oil & Refining Co.'s refinery here is scheduled to be completed in June.

About 60,000 bbl. of the new still's capacity will be used to replace that of outdated equipment now being retired. The 10,000 bbl. in additional capacity will boost the refinery's daily crude throughput to 260,000 bbl.

The big unit is a conventional two-stage pipe still with integral desalting facilities which operate on the basis of electrical precipitation. It is designed to process sour crude at its rated capacity.

The still will have a vacuum-coil outlet temperature of 780°-800° F. and the flash zone will run under an absolute pressure of 100 mm. of mercury. It is expected that average West Texas crude going through the plant will yield about 15 per cent bottoms.

Of the current throughput of the refinery, about 245,000 bbl. is handled by the primary distillation equipment and varying amounts of crude go directly to thermal unit coils. When the new still is placed on stream, all crude will be diverted from the thermal coils to the primary distillation system, and old distillation equipment will be retired.

Big Flasher Near Completion

RICHMOND, Calif. — Construction of Standard Oil Co. of California's new 55,000-bbl. vacuum flasher, the world's largest, is now more than 75 per cent complete, according to M. W. Kellogg Co., constructors.

The big flasher is scheduled to go on stream at Standard's refinery here by the middle of July. It is designed to process about 30,000 bbl. of feed per day for the existing catalytic cracking unit which is now being revamped.

Asphalt bottoms from the flasher will be charged to visbreakers to produce gasoline and high-quality fuel oil.

The main tower of the flasher will be 100 ft. tall and 27 ft. in diameter.

Shell Aromatics Plant

HOUSTON. — New facilities to be built by Shell Oil Co. at its refinery here will produce about 1,250 bbl. of benzene and 2,500 bbl. of toluene concentrate daily, F. S. Clulow, vice president in charge of manufacturing, has announced.

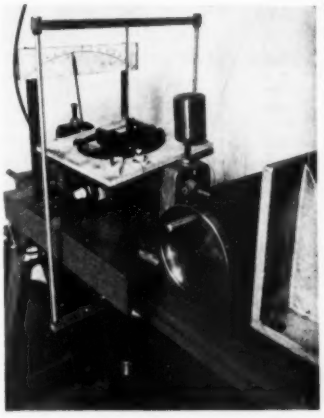
The plant will use a gasoline fraction obtained during crude distillation as a raw material. This fraction will be run through a Platforming unit at a temperature of about 900° F. and a pressure of 250 psi. Reactions in the platformer will take place in a hydrogen atmosphere and in the presence of a catalyst containing platinum.

The Platforming unit will be constructed by Procon, Inc., a subsidiary of Universal Oil Products Corp., of Chicago. The aromatics concentration section, which separates and purifies benzene and toluene, will be built by Foster Wheeler.

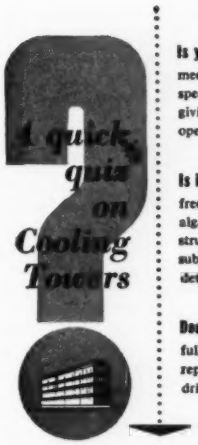
Work Begins on Gulf Lab

PITTSBURGH. — Ground has been broken for Gulf Oil Corp.'s new chemical research laboratory at Harmarville near here, and company officials predict that the $1,100,000 project will be completed about this time next year.

The product-development, analysis, and organic-synthetic sections of Gulf's chemical division will occupy the new facilities. The buildings now housing these sections will make available additional space for the



***TESTING LUBRICANTS.** — New specialized lubricants are tested by the National Bureau of Standards in this inclined-plane apparatus. These include chlorinated and fluorinated hydrocarbons with and without additives. A metal rider rests on a flat lubricant-coated metal plate. The plate, initially horizontal, is slowly tilted until the rider starts to slide. A pointer indicates the angle of tilt. The rider's motion closes a low-voltage circuit and lights a lamp. The tangent of the angle of tilt at which sliding begins is the coefficient of friction. This is taken as an index of the ease with which a metal surface will start to slide in relation to another lubricated surface.*



Is your cooling tower meeting design specifications . . . giving trouble-free operation?

Is it . . . free of accumulative algae . . . safe from structural failure . . . subject to accelerated deterioration?

Does it have . . . full decking in good repair . . . minimum drift loss efficiency?

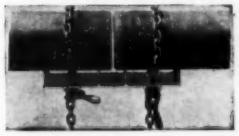
Use these 2 Fluor Services

1. Let Fluor inaugurate a preventative maintenance program—free of charge.

2. Let Fluor inspect for needed repair—recommend on a competitive bid basis.

Inquire through any Fluor Office

THE FLUOR CORPORATION, LTD.
2500 SOUTH ATLANTIC BLVD., LOS ANGELES 22, CALIF.
offices in
NEW YORK • CHICAGO • TULSA • HOUSTON • SAN FRANCISCO



WELD PIPE
Faster... Easier... Truer
WITH
JEWEL PIPE CLAMPS

They align pipe perfectly and hold it secure for tacking. On in a minute—off in ten seconds. Two sizes, ½ to 8 in.—8 to 16 in. Rigid construction resists strain, heat, and abuse.

Other Jewel Clamps for Ells, long and short turn—for Flanges—for Headers. Also Pipe Marker, eliminates patterns for holes and saddles.

So simple—so easy to use—Jewel Tools are proving big time-savers in refinery piping fabrication and erection.

Write Today for Details and Prices

Jewel Manufacturing Co.
1841 University Ave.
ST. PAUL 4, MINNESOTA

NOW you can

LUBRICATE PLUG VALVES

Automatically!

EVERY TIME...

...They're OPENED and CLOSED

... with the

DELTA AUTOMATIC Plug Valve LUBRICATOR

This simple, low priced device is the mechanical brain that *always* remembers to lubricate your valves. It is the answer to a long felt need. Like the Delta Gun, Delta Fittings and Delta-Desco Lubricants—it is another *first* developed by the Delta Plug Valve Lubricating Specialists.

WRITE FOR FOLDER—NOW!

The Only Complete Plug Valve Lubrication Company

DELTA

DELTA-DESCO SYSTEM

ENGINEERING SALES CO.

806 Louisiana Ave. • P. O. Box 678

Phone 5-2416

SHREVEPORT, LOUISIANA, U. S. A.

BRANCH OFFICES: Tulsa, Amarillo, Houston Los Angeles, Chicago, Detroit, Cincinnati, Cleveland

physics, materials and production chemistry, and engineering divisions.

The new three-story structure will be functional in design and furnishings. It will be 169 ft. long by 51 ft. wide, and contain 33,000 sq. ft. of gross floor area. It will house 33 laboratory rooms, 25 offices, 5 service and chemical-storage rooms, and a conference room.

Synthetic Rubber Faster

BARTLESVILLE, Okla. — An improvement in synthetic-rubber manufacturing equipment which may increase capacity in government-owned rubber plants from 20 to 50 per cent with minor plant changes has been developed by Phillips Chemical Co., according to company officials.

Phillips engineers have devised a means of inserting cooling coils in plant reactors to remove heat faster, the company said, and thereby have cut the time required to make rubber to 8 hours instead of the usual 12 to 14.

That rubber could be made in a much shorter period has been known for some time, Phillips said, but the faster reactions could not be employed because present equipment could not remove the much greater amount of heat generated.

Rubber is now being made in 8 hours on plant scale runs at the Phillips Chemical - operated government synthetic - rubber plant at Borger, Tex.

Crude Analyzing Explained

WASHINGTON.—Bureau of Mines' methods of analyzing several hundred types of different crudes on a comparable basis are described in detail in a bulletin now available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

The report describes equipment and procedures used by the bureau in making routine analyses—distillation, sampling and sample handling, determinations of properties, and preparing analyses reports. Also included is an outline showing step-by-step procedure with paragraph reference to detailed discussions earlier in the bulletin.

An appendix includes a bibliography of reports and a list of published analyses of crude oils arranged by states and fields in alphabetical order, with reference to publications in which each can be found.

The report, Bureau of Mines Bulletin 490, is available for 50 cents.

Refining Briefs

Standard Oil Co. of Texas plans to install a Houdry catalytic cracking unit at its El Paso refinery. The new unit will have a design capacity of 11,000 bbl. It will be constructed by Catalytic Construction Co.

OIL AND GAS BURNING EQUIPMENT

- Mechanical Atomizing Oil Burners
- Steam Atomizing Oil Burners
- Refractory Burner and Muffle Blocks
- Industrial Gas Burners
- Low Air Pressure Oil Burners
- Fuel Oil Pump Sets
- Valves, Strainers, Furnace Windows
- Tandem Block Combustion Units
- Combination Gas and Oil Burners

Detailed information gladly sent upon request.

NATIONAL AIROIL BURNER COMPANY INC.

1236 Sedgley Ave., Philadelphia 34, Pa.

Southwestern Division: 2512 So. Blvd., Houston 6, Tex.

"GUNITE" CONCRETE

(SINCE 1915)

LININGS FOR

BUBBLE TOWERS • SETTLERS • STILLS • SEPARATORS • TANKS • AND VESSELS OF ALL TYPES • ENCASING AND FIREPROOFING STRUCTURAL STEEL AND PIPE • LINING WATER RESERVOIRS, DITCHES, DRAINS, AND CANALS • REPAIRING DISINTEGRATED CONCRETE AND OTHER MASONRY.

See our catalog in Sweet's

GUNITE CONCRETE & CONST. CO.

1301 Woodswether Road, Kansas City 6, Mo.

DISTRICT BRANCH OFFICES

S. T. Burton Co., 228 N. LaSalle St., Chicago 1, Ill.

George R. Lewis Co., 2036 Queen Avenue S., Minneapolis 5, Minn.

B. H. Mueller Co., 6625 Delmar Blvd., St. Louis 5, Mo.

Ole K. Olsen Co., 823 Perdido St., New Orleans, La.

Philip D. Barnard, 2036 Addison, Houston 5, Tex.

Western Steel Prod. Co., 1735 W. 13th Ave., Denver 4, Colo.

GROVER ONEILL & CO.

Established 1924

FINANCING

20 Exchange Place New York 5, N. Y.

DIgby 4-0690

this marks a **VICTOR** *stud...*

a dependable fastener

where high tensile strength, resistance to creep and fatigue is necessary at high temperatures.

Ask for the new VICTOR Catalog.

VICTOR PRODUCTS CORP.

3635 W. BELMONT AVE. • CHICAGO 18, ILL.

How to improve operating efficiency

Replace the magnetos on your pumping engines with Fairbanks-Morse Super Spark Magnetos. Engineered to operate more efficiently for longer periods of time under the most severe conditions. Just start the engine and forget ignition failure. Ruggedly built for long continuous operation . . . oversize high tension coils with extra wrapping . . . long lasting breaker points . . . ball bearing supported one piece magnetic rotor.

- **COMPACT** . . . one unit within a dust- and moisture-proof housing . . . unaffected by dirt, mud and water.
- **SIMPLE** . . . fewer working parts . . . easy access for adjustment and service.
- **DEPENDABLE** . . . quick starting . . . long lasting.

Change today to Super Spark Magnetos for better performance and dependability under all operating conditions. Types for most engines. See your Fairbanks-Morse Magneto Distributor or Service Station, or write Fairbanks, Morse & Co., Magneto Division, Beloit, Wisconsin.

FAIRBANKS-MORSE

A name worth remembering

MAGNETOS ZC ENGINES MOTORS PUMPS DIESELS

GIVE YOUR ENGINES THE MAGIC OF MARVEL MYSTERY OIL

In gas fueled engines, especially, it takes a minor miracle to *properly* lubricate top cylinder areas. Here, where heat is highest, lubrication is usually lowest . . . and wear is greatest! That's where Marvel Mystery Oil and the Marvel Inverse Oiler go to work for you.

Marvel Mystery Oil retains *extra*-high film strength at temperatures where ordinary lubricants break down. And, added to positive protection, there's amazing solvent action in Marvel Mystery Oil . . . gums and varnish disappear from valves, rings and guides. The engine *stays clean* inside.

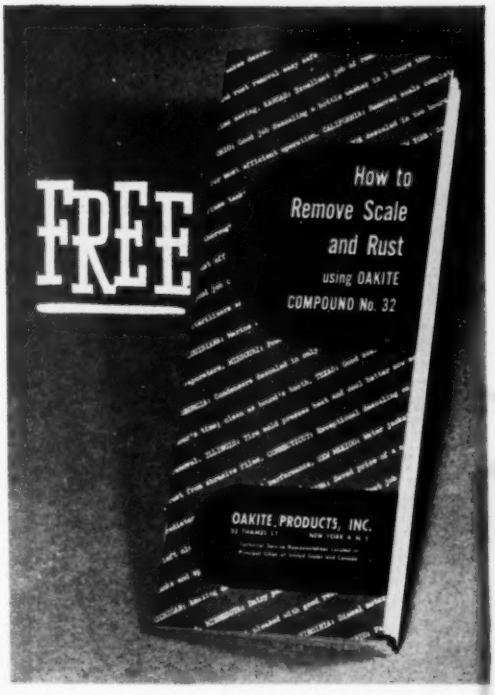
When lubrication is right, "down" time drops to a startling new minimum . . . oil field engine life stretches to a surprising new maximum. Ask for the facts. Emerol Mfg. Co., Inc., 242 W. 69th St., New York 23, N. Y.

The Model TU Marvel Inverse Oiler, easily installed, proportions the flow of Marvel Mystery Oil precisely to the needs of your engine.

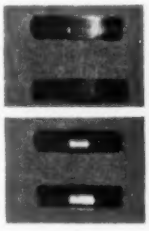
use the

MARVEL

INVERSE OILER WITH MARVEL MYSTERY OIL



Section of pipe before and after descaling with Oakite Compound No. 32



Rusty bolts look good as new after treatment with O. C. 32

Get more production—longer equipment life!

GET rid of crippling scale and rust the fast, safe chemical way—with Oakite Compound No. 32.

This inhibited acid material quickly dissolves scale and rust without attacking sound metal. Much quicker than rodding, lancing, or steaming-out; much safer than raw commercial acids. Cuts down-time—saves equipment.

Use Oakite Compound No. 32 to descale heat exchangers, diesel water-cooling systems, fractionating and absorption towers . . . to de-rust valves, fittings, steel shaft casings, chains, etc.

FREE BOOKLET F4305 tells all about it. Ask your local Oakite Petroleum Service Representative, or write Oakite Products, Inc., 44C Thames St., New York 6, N. Y. No obligation.

Technical Service Representatives in Principal Cities of U. S. & Canada

OAKITE

PETROLEUM SERVICE DIVISION

UNAFLO*

is proved in the deepest

If you plan to cement—keep this thought in mind: Unaflo was Superior Oil Company's choice for cementing that 19,765-foot string at Pacific Creek No. 1. The job went without a hitch. Unaflo flowed easily and formed a tight seal all the way down that record-depth hole.

On your next cementing job insist on Unaflo three-way protection:

1. EASY PUMPING—Unaflo has high initial fluidity. This makes pumping easier, permits use of heavy slurries when they're needed.

2. RETARDED SET—Unaflo isn't just slow-setting. It stays fluid and pumpable throughout the retardation period, gives you ample time, even in emergencies, to get cement in place.

3. DENSE SEAL—A slurry of Unaflo hardens normally after retardation to form a tight seal and a strong bond resistant to sulfate waters. To be sure... always protect your investment with Unaflo.

Send for helpful free bulletin. Shows Unaflo applications, has easy-to-follow tables on various cementing operations. Get your copy of "UNAFLO Oil-Well Cement." Write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

LABORATORY TESTS SHOW UNAFLO'S DELAYED, RETARDED SET

Stanolind Pressure Thickening—Time Tester

Thickening time—40% mixing water. Slurry weight: 16.5 lb./gal.

WELL CONDITIONS			Viscosity in Poises at time (Hrs.-Min.) Indicated								Thick. Time Hr.-Min.
Well Depth (Ft.)	Max. Temp. °F.	Max. Pressure-psi	0	0:15	0:30	1:00	1:30	2:00	3:00	4:00	
6000	113.0	3957	6	8	8	10	10	10	24	77	4:03
8000	125.0	5156	6	7	8	8	8	15	45		3:15
10000	144.0	7484	7	7	6	6	7	8	63		3:03
12000	172.0	10227	11	11	12	12	11	18			2:31
14000	206.0	13386	10	11	11	14	17	20			2:25
16000	248.0	16144	9	9	10	11	19				1:41
18000	300.0	13800	8	8	8	8	47				1:33

**"UNAFLO" is the registered trade mark of the retarded oil-well cement manufactured by Universal Atlas Cement Company*

WACO • KANSAS CITY • BIRMINGHAM • CHICAGO • NEW YORK • Export Distributor: United States Steel Export Co., New York

Universal Atlas Cement Company

UNAFLO
RETARDED OIL-WELL CEMENT

OIL-FIELD CEMENTS

Unaflo *Retarded* Oil-Well Cement
Resistant to Sulfate Waters
Atlas Portland Cement—Type I

Atlas Portland Cement—Type II
Resistant to Sulfate Waters
Atlas High-Early Cement—Type III

OG-U-121

"THE THEATRE GUILD ON THE AIR"—*Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—NBC Network*

Anadarko Area Heats up Again

THE western portion of the Anadarko basin has alternated between "hot" and "cold" for years, with most of those years being on the cold side. Right now it's hot. Judging from the past, it won't stay hot very long though unless encouraging signs continue to develop so that more wildcatters are attracted to the area and kept interested in it sufficiently long to get a substantial number of thoroughly tested holes dug.

Geologist can point out reasons why this area should produce oil, especially from stratigraphic accumulations in Pennsylvanian and Mississippian rocks, but in the same breath they can tell you why it isn't producing. The principal answer seems to be because it is one of those areas where reasons for pinpointing wildcat locations are just about nonexistent. Surface mapping is not reliable. Core drilling results "will drive you crazy." Seismic work, probably because of shallow high-velocity beds, is for the most part unsatisfactory. Consequently very few wildcats have been drilled in this area simply because it has been found "rather difficult" to get drilling money when the only reason why one location is better than one 20 or more miles in any direction is because "I've got a hunch." However, now and then a reason to drill a wildcat has been sold. There have been limited successes in the past and a number in recent weeks.

Up along the Kansas - Oklahoma state line (A on sketch) considerable interest is being attracted to the area of the H. L. Hunt 1 Light Estate, a gas-distillate well completed back in 1947. Three miles north of this well Jomilson Producers 1-B Light flowed 28 bbl. of 42°-gravity oil per hour for 16 hours. Then ½ mile south of Hunt's well J. M. Huber Corp. 1 Wallace made 92 M.c.f. gas per day with a recent 24-hour test yielding 80 bbl. of distillate per day through a 50/64-in. choke. Now being completed as a gas-distillate well is Huber 1 Fees, about ½ mile south of Jomilson's well. All of these recent wells are producing from what is believed to be the basal Pennsylvanian-Morrow sand at about 6,000 ft.

There are other wells that offer clews to where to attack this region

to find porosity sufficiently developed to reservoir oil. At B Columbia Fuel Corp. completed 1 Kneeland for 80 bbl. of oil and an equal amount of water in the basal Pennsylvanian. At C the same company plugged back its 1 Novinger, a recently completed Mississippian well, and got a flow of 800 bbl. of oil in 8 hours from the Pennsylvanian-Marmoton. Over near the old Adams Ranch gas-distillate field at D, Columbia Fuel is digging a hole that flowed oil by heads at the rate of 10 bbl. per hour from the Marmoton. Skelly Oil Co. completed a gas-distillate well last August at E where a second producer is now being completed after an unsuccessful attempt to extend the pool. At F is Stanolind Oil & Gas Co. 1 Daisy Wall, a Viola well completed for 129 bbl. daily.

Getting down into the deeper part of the basin, Sinclair Oil & Gas Co. 1 Morrow (G) flowed at an estimated rate of 10 bbl. of oil per hour on a drill-stem test of the Viola-Simpson at about 9,700 ft. Water later developed in the interval but the hole has since been cased and tests under more controlled conditions are scheduled. Along the Wichita Mountain front, actually in a sub-province apart from the broad flank area to the north, Carter Oil Co. 1 Garrett (H) is recovering oil on test of the Hoxbar—this is the well that almost got away about 2 months ago *(see this page in March 15 issue)*.

Just what lasting effects these scattered encouraging signs foretell is anybody's guess, but if any of the several wildcats staked or getting under way can add fuel to the fire, interest in this area will reach a high pitch and reasons to drill wildcats will suddenly become plentiful.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WESTERN KANSAS.—Cities Service Oil Co. 1 Coberly, 15-14s-29w, Gove County discovery well, has been completed with a maximum state potential rating from the Marmaton lime. Kansas side of two-state Light pool is getting its second producer with J. M. Huber Corp. 1 Fees, Seward County, flowing gas and distillate.

SOUTHWEST TEXAS.—Phillips Petroleum Co. 9 Copano Bay State has been potentialed for 362 bbl. of 42.5°-gravity oil through a 3/16-in. choke from perforations at 6,660-70 ft.

CALIFORNIA.—In Cuyama Valley, Seaboard Oil Co. and Richfield Oil Corp. 78-22 Kirschenmann has been completed as a 175-bbl. pumper from two zones stratigraphically higher than others producing in the valley to open Central Cuyama pool.

ROCKY MOUNTAIN AREA.—Continental Oil Co. has cored 137 ft. of saturation at the important Tensleep deep test in Sussex field, Johnson County, Wyoming, indicating one of the most important reserves to be found in the Rocky Mountains in recent years. Shell Oil Co. has started the Richey area, Dawson County, Montana, wildcat as another deep test in the Williston Basin.

Southwest Texas

Copano Bay Oil Discovery Potentials for 362 Bbl.

CORPUS CHRISTI.—Phillips Petroleum Co.'s promising new discovery, 9 Copano Bay State, Tract 67, located a mile southwest of Copano Bay field and a mile northwesth of Fulton Beach field, Aransas County, has been potentialed for 362 bbl. of 42.5°-gravity oil daily through 3/16-in. choke. Test was made through perforations at 6,660-70 ft. Hole is bottomed at 8,050 ft. with $5^1/_2$-in. casing set to 7,843 ft. through a large number of sands that had oil and gas shows. We'l cut at 100-ft. fault at approximately 5,000 ft. and another fault of 500-ft. displacement at approximately 6,500 ft.

The most prolific section was cored between 6,630-6,800 ft., and was reported to contain 150 ft. of effective sand body with good oil show. In addition, gas-condensate sands were logged at 5,080-5,100 ft., 6,555-65 ft. and 6,580-6,610 ft. Additional oil sands were logged between 7,200-7,300 ft.

Potential has been run on a new oil discovery well in Hidalgo County. Taylor Refining Co. and Mayfair Minerals Corp. 1 Boris Marinoff, oil discovery in Los Torritos field, flowed 257 bbl. of 49.4°-gravity oil daily through 3/16-in. choke. Perforations were made at 5,850-56 ft. This well is located in Lot 85 of Santa Anna Development Co. Unit 3, Porcion 72, and lies 1,600 ft. west of Lockhart 1 First National Bank of Chicago, gas-condensate discovery well for the area.

Kirkwood & Morgan, Inc., 1 O. S. Petty, wildcat in southwestern LaSalle County, has been abandoned at total depth of 5,310 ft. after several attempts to get a good sidetrack from the old hole failed.

Sun Oil Co. has completed 1 Copano Bay State Tract 76, discovery well for West Fulton Beach field, for 171 bbl. of 41°-gravity oil daily through $^1/_8$-in. choke. Hole was perforated at 7,126$^1/_2$-30$^1/_4$ ft. for completion. Tubing pressure on the test was 1,000 psi.

Humble Oil & Refining Co. is preparing to set casing in its Kenedy County wildcat, E-1 John G. Kenedy, Jr., $5^1/_2$ miles south of Sarita field in El Paistle area. The test was drilled to total depth of 11,794 ft., plugged back to 9,166 ft., sidetracked, and drilled to 10,200 ft. in the sidetracked hole.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Aransas County: New pay at Fulton Beach—Sun Oil Co. 1 Copano State Tract 74, located in Copano Bay, State Tract 74, TD 7,197 ft., perf. 7,166-71 ft., IP: 76 bbl. oil per day, 7/32-in. choke, 41° gravity, TP 210 psi.

Hidalgo County: New pay at Cecil—Taylor Refining Co. 1 Garcia Land & Livestock Co., Porc. 42, TD 8,208 ft., perf. 3,974-92 ft., IP: 38 bbl. oil per day, 7/64-in. choke, 42° gravity, TP 1,090 psi., CP 1,500 psi.

Oil discovery at Los Torritos—Taylor Refining Co. and Mayfair Minerals Corp. 1 Boris Marinoff, Lot 85 of Santa Anna Development Co. Unit 3, Porc. 72, TD 9,016 ft., perf. 5,850-56 ft., IP: 257 bbl. oil per day, 3/16-in. choke, 49.4° gravity.

McMullen County: Gas discovery—Newman Bros. Drilling Co. and Alaska Steamship Co. 1 Mrs. Lowe Craig, J. Poitevent Sur. 17, A-366, TD 6,246 ft., Wilcox 5,473-88 ft., IP: 1,490,000 cu. ft. of gas per day, $^1/_8$-in. choke, Sip 2,085 psi.

San Patricio County: Oil discovery, "Roots"—Rock Hill Oil Co. 1 W. L. Roots, Lot 4, Sec. 24, 4th Addn. of Taft Farm lands, TD 7,515 ft., perf. 6,042-46 ft., IP: 86 bbl. oil per day, 9/64-in. choke, 35.9° gravity, TP 425 psi.

Starr County: Sun Oil Co. 3 A. C. Jones-State, Antonio Garza Acevedo Sur. 10, TD 4,668 ft., perf. 4,657-61 ft., IP: 131 bbl. oil per day, 5/42-in. choke, 46.8° gravity, TP 330 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bastrop County: S. D. Rorem 1 Ted B. Wimberly, P. R. Redfield Sur. 2, 6 mi. SE of Bastrop, dry, TD 5,060 ft.

Bell County: J. P. Bristow 1 Zuehlke, M. F. de Graffenreid Sur., dry, TD 1,161 ft.

Duval County: Hawn Bros. & Rowden-Rowden 1 Strasburger, et al, B. Elizondo Sur., A-1837, dry, TD 3,905 ft.

Holly Development Co. & Barbara Oil Co. 16 Driscoll Estate, Sweden Farm Lot 67, Santa Rosalia Grant, dry, TD 3,111 ft.

Frio County: H. L. Hunt 1 Ora McCauley, R. T. Co. Sur. 1815, A-1411, dry, TD 6,276 ft.

Jim Hogg County: O. W. Killam 2 M. A. Yaeger, Sur. 101, A-250, dry, TD 3,716 ft.

LaSalle County: Henderson Coquat, I&GN RR Co. Sur. 11, A-503, dry, TD 6,300 ft.

H. L. Rymal & Newman Bros. Drilling Co. 1 H. L. Rymal, SA&MG Sur. 18, A-1657, dry, TD 2,421 ft.

Nueces County: Atlantic Refining Co. 1 State Tract 254, State Tract 254 in Red Fish Bay, dry, TD 9,002 ft.

San Patricio County: The Chicago Corp. A-3 J. F. Odem, Archibald Herrons Sur., A-166, dry, TD 8,111 ft.

Skelly Oil Co. 1 J. F. Smith, Sec. 4, Cubage & Miller Subd. of O'Connor Ranch, dry, TD 7,753 ft.

South Louisiana

Water-Shutoff Attempt Made At Groose Tete Wildcat

NEW ORLEANS.—Sohio Petroleum Co. continues to test its wildcat on Groose Tete prospect in West Baton Rouge Parish. Latest test was made through perforations at 10,053-61 ft., and the well flowed 97 bbl. of high-gravity oil along with 145 bbl. of salt water. The venture, B-1 A. Wilbert & Sons, 31-7s-11e, had previously been reported making gas and distillate, but no gage was reported. Operators squeezed the above perforations in an effort to shut off salt water flow.

Attempt to confirm production in the new Reeves field of Allen Parish, failed when Niloco Oil Co. and Bel Oil Corp. abandoned 1 J. A. Bell et al at total depth of 7,500 ft. Although running flat structurally with the discovery well, same operators' 1 Bel-Krause, the two sands which indicated production in the pool opener were shaled out in the confirmation effort. The failure is located in C SW SE NW 25-6s-7w, 1,320 ft. north and east of the discovery.

Atlantic Refining Co. 1 Dudley Le Blanc, 62-12s-5e, in the Jefferson Island area of Vermilion Parish, is at plugged-back depth of 11,275 ft., and operator is preparing to perforate after drill-stem test of perforations at 11,314-44 ft. recovered salt water. Hole is bottomed at 11,631 ft. with $5^1/_2$-in. liner cemented from 9,133 to 11,444 ft.

Testing operations are scheduled to begin at Superior Oil Co.-Clovelly Corp. 2 Clovelly Corp., 33-18s-22e, Lafourche Parish, confirmation test to the discovery of Clovelly field. This well is bottomed at 13,070 ft. with 7-in. casing cemented on bottom. Operator is running tubing preparatory to testing. This new field is located on the Brustle Prospect.

Following Sun Oil Co.'s discovery of a deep new sand in Chacahoula field, Lafourche Parish, Humble Oil & Refining Co. has been issued a permit for 1 C. J. Adams, et al, 57-15s-15e, which is scheduled to drill deep enough to penetrate the 14,000-ft. sands.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Allen Parish: Oil discovery, "Reeves"—Niloco Co. & Bel Oil Corp. 1 Bel-Krause, 25-6s-7w, TD 7,515 ft., Frio 5,888-90 ft., IP: 53 bbl. oil per day, 5/64-in. choke, 27.8° gravity, TP 1,300 psi.

Oklahoma

Wilcox Sand Pays Off In Lincoln County Test

A. R. McELREATH and associates have found what appears to be another good pool for Lincoln County. Their 1 Robertson, prospective discovery well, located in the SE NW SW 3-14n-6e, about 2 miles southwest of Stroud, in the eastern part of the county, made flows at rates ranging up to 60 bbl. of oil per hour during preliminary production tests of its second Wilcox sand pay zone.

Total depth is 3,934 ft. with $5^1/_2$-in. casing run to 3,933 ft., 1 ft. off bottom. Top of the second Wilcox pay zone was logged at 3,845 ft. (surface elevation 816 ft.). Operators had intended perforating casing opposite this zone but when plug was drilled out the well started flowing from the foot of open hole below the casing.

With flow restricted to 18/64-in. choke, the well, after cleaning, filled a 250-bbl. tank in a little over 6 hours, averaging 40 bbl. per hour. Flowing pressure was 425 psi. and gas-oil ratio 270 cu. ft. per barrel. On a later run after having been shut in, the well flowed 612 bbl. in 12 hours, averaging 51 bbl. per hour. Shut in again and then reopened it gaged 20 bbl. in 15 minutes, or at the rate of 60 bbl. per hour.

The same operators have made location for a northwest diagonal offset, and Hubbell & Webb, Stroud operators, are starting a test a little over $^1/_2$ mile northwest.

Finston & Co. 1 Dumas, another new Lincoln County discovery well, located in the NE NE NE 6-16n-3e, $2^1/_2$ miles west of the Northwest Tryon pool, flowed 13.68 bbl. net oil with about $1^1/_2$ bbl. of water through $^1/_2$-in. choke during a 12-hour test run. Its pay zone is Bartlesville sand, topped at 4,246 ft. and open at 4,248-60 ft. Testing continues.

Another new Bartlesville (Burbank) sand pool has been opened in western Osage County. Discovery well is Service Drilling Co. 1 Osage, SE NE SE 5-24n-7e, which first flowed 361 bbl. of clean oil in 18 hours through 7/16-in. choke on casing. Through 7/16-in. choke on tubing, it averaged 6 bbl. of oil per hour, and through $^1/_4$-in. choke, it flowed 8.72 bbl. per hour. Location is a mile northwest of the Naval Reserve pool.

Carter Oil Co. is continuing tests at its 1 Garrett, SE SE SE 32-11n-25w, prospective deep discovery well in northwestern Beckham County. A packer test of casing perforations at 10,290-295 ft. with well open 12 hours filled 2,790 ft. of oil. From perforations at 10,285-90 ft., 1,090 ft. of oil was recovered in a similar test. Latest reported test was of perforations at 10,280-285 ft. in which the well flowed by heads approximately 20 bbl. of oil over a 12-hour period. Gas was at the surface within 22 minutes after the well was opened. By running swab, the well yielded 35 bbl. in 8 hours. Fluid stands at 7,500 ft. Gravity of the oil is 40°.

OKLAHOMA SUCCESSFUL WILDCATS

Stephens County: Peppers Refining and Carter Oil 1 Smith, NW SW SE 4-2n-8w, pumped 21 bbl. 33°-gravity oil from Hoxbar at 6,716-30 ft., TD 7,500 ft., sand 2,435 ft. and 5,425 ft.

Peppers et al 1 Gentry, NW NW SW 4-2n-8w, flowed 5 bbl. 34°-gravity oil from Hoxbar at 7,056-7,444 ft., TD 10,014 ft., $^1/_2$-mile NW extension to new pool.

OKLAHOMA WILDCAT FAILURES

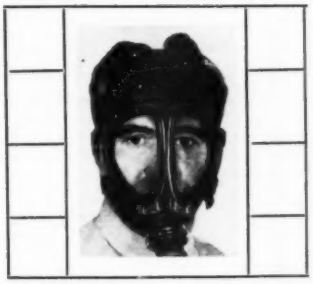
Carter County: E. Dunlap, Jr., and Milford 1 Fulton, NW NW NW 33-4s-2w, dry, TD 3,994 ft.

Cotton County: Halliburton 1 Fietz, NE NE SW 12-1s-10w, dry, TD 2,992 ft.

Timberlake & Kelleher 1 Dilks, SW NE NE 27-3s-11w, dry, TD 1,601 ft.

Benton Ross 1 Perry, SW SW NE 15-3s-13w, dry, TD 2,330 ft.

Kay County: Mazda 1 Cales, NE SW SW 7-27n-4e, dry, TD 3,304 ft.



ACME....the Only Gas Mask with the "PICTURE WINDOWS"

You never have that "jammed-in" feeling, wearing the Acme Full-Vision Gas Mask. Its patented, larger lenses are like picture windows, giving you full natural vision for that safe, unconfined feeling. When you walk, you can actually see your toes without bobbing your head. This factor alone makes Acme outstanding among gas masks . . . well worth looking into.

Write for complete story on Acme Gas Masks for the oil industry.

ACME PROTECTION EQUIPMENT COMPANY
3037 West Lake Street, Chicago 12, Illinois

CUT MAINTENANCE COSTS.... Now!

Murphy Safety Switches prevent engine "burn-up" due to

- ★ Low oil pressure
- ★ High water temperature
- ★ Low oil level
- ★ Low water level

AUTOMATIC DEPENDABLE

Murphy Safety Switches are easily installed, withstand continuous duty. Each switch is individually tested and calibrated to insure long service.

For full particulars, write, wire or call

FRANK W. MURPHY *Manufacturer*
BOX 1470 TULSA, OKLA.

Colpitt 2 Miller, SW NW SE 15-28n-3e, dry, TD 3,104 ft.

Lincoln County: Delaney 1 Simmering, SE SW NW 23-13n-5e, dry, TD 3,489 ft.

Josaline 1 McClain, SW SW NW 4-16n-3e, dry, TD 4,285 ft.

Davon 1 Southers, NW NW SE 33-16n-5e, dry, TD 3,701 ft.

Noble County: Dirickson-Lewis 1 Eyler, SW SW SW 10-21n-2e, dry, TD 4,210 ft.

Flynn 1 Wilson, NW NW SE 34-23n-1e, dry, TD 3,354 ft.

Deep Rock 1 Sommes, SW SW NE 28-21n-1e, dry, TD 3,354 ft.

Osage County: Oliphant 1 Osage, NW NE NW 4-24n-4e, dry, TD 3,529 ft.

California

Completion Efforts Continue At Pleito Creek Wildcat

LOS ANGELES. — In extreme southeastern San Joaquin Valley, 4½ miles southwest of the old Wheeler Ridge field, Humble Oil & Refining Co. continued its efforts to complete a Pleito Creek wildcat as a new field discovery. The test is 1-B 34-35 Kern County Land in Section 35-11n-21w. At the weekend the operator was preparing to set a pumping unit to complete it as a pumper from a tight sand at 4,275-4,335 ft.

The wildcat originally was drilled to 5,451 ft. and then plugged back and redrilled up-structure. After redrilling to 4,387 ft., casing was set at 4,335 ft. Subsequent swabbing tests resulted in the recovery of an undisplosed amount of 19°-gravity crude.

In Cuyama Valley, Seaboard Oil Co. completed its joint venture with Richfield Oil Corp. as a 175-bbl. pumper from two zones at 7,272-78 and 7,362-72 ft. Designated 78-22 Kirschenmann and located in Section 22-10n-26w, the wildcat opened a stratigraphically higher producing zone for the valley. The discovery has been labeled Central Cuyama.

Midway between Russell Ranch and Morales Canyon fields in northeastern Cuyama, R. B. Watkins was coring below 5,220 ft. at 1 Luce in Section 14-11n-28w. Top of the Dibblee was logged at 4,561 ft., at which depth 7-in. casing was set. Formation tests made after drilling and coring to 4,756 ft. caused scouts to predict the wildcat probably would be good for a 150-bbl., high-gravity producer.

CALIFORNIA SUCCESSFUL WILDCAT

Santa Barbara County, Central Cuyama, new field discovery: Seaboard Oil Co. 78-22 Richfield - Kirschenmann, 22-10n-26w, pumped 175 bbl. of 44.2°-gravity crude, 17 per cent cut, from perforations at 7,272-78 and 7,362-72 ft., TD 10,097 ft., plugged back to 7,490 ft., elev. 2,280 ft. Field located about 3½ miles northeast of South Cuyama field.

CALIFORNIA WILDCAT FAILURES

Kern County, Arvin area: The Texas Co. 1 Kovacevich, 27-31s-29e, dry, TD 11,242 ft., elev. 415 ft.

Comanche Point area: Cliff Zilligitt 1 Morris, 4-11n-18w, dry, Santa Margarita 700 ft., TD 1,433 ft., elev. 890 ft.

Poso Creek area: Bankline Oil Co. of California 23 Daviess Realty Co., 3-28s-27e, dry, TD 2,553 ft., elev. 878 ft.

Rosedale area: Bankline Oil Co. 35-7 Kern County Land, 7-30s-27e, dry, TD 8,008 ft., elev. 370 ft.

South Belridge area: Kimberley Exploration Co. 1 Kimberly-U. S. Govt., 30-28s-22e, dry, TD 2,505 ft., elev. 360 ft.

Tejon Hills area: Harris Investment Co. 1 Harris, 10-11n-18w, dry, Santa Margarita 480 ft., TD 494 ft., elev. 1,095 ft.

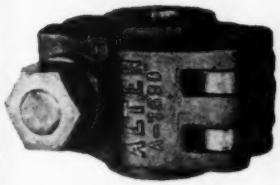
James H. McCue 1 McCue, 11-11n-18w, dry, bottomed in basement, TD 490 ft., elev. 1,404 ft.

Los Angeles County: The Texas Co. 1 Davies, 2-5n-17w, dry, TD 4,794 ft., elev. 1,338 ft.

Orange County, Anaheim area: Sunray Oil

SOMETHING DIFFERENT

ALTEN WONBOLT POLISHED ROD CLAMPS



Holds over 35,000 lbs. — one nut to secure — goes on or off without being taken apart —speeds up well spacing and repair.
Only Alten makes the Wonbolt.

2 AND 4 BOLT CLAMPS

Lowest priced clamps you can buy —new exclusive design saves installation time.

ALTEN POLISHED RODS

Smooth, bright, and built for long life. Accurate dimensions reduce packing replacement. Individually packaged for easier handling and storage.

Made from top-grade steel and carefully threaded for perfect fit.

ALTEN MAKES THE WORLD'S BEST PUMPING UNITS.

ASK FOR COMPLETE ALTEN LINE AT YOUR LOCAL SUPPLY STORE

ALTENS FOUNDRY & MACHINE WORKS, INC.
Lancaster, Ohio

SAFE!
Smart Money is on Scottie McBlock in the big league.
IT'S ALWAYS SMART TO PUT YOUR MONEY ON A
SUPER CHAMPION
• FOR TOP PERFORMANCE
• REAL ENDURANCE
• EXTRA DUTY SERVICE . .
Drop forged, heat treated swivel hook or shackle for super duty . . . 8" - 10" - 12" and 14" steel sheaves, grooved to fit proper line size. Large diameter center pin. High speed bronze bushings or roller bearings. Alemite lubrication.
FOR LOADS UP TO 40 TONS
Write for information on this and other McKissick Products.
McKISSICK BUILDS A BETTER BLOCK FOR EVERY PURPOSE
McKISSICK
McKISSICK PRODUCTS CORPORATION
Box 2496 Tulsa, Oklahoma

Corp. 1 Foiles, 22-4s-10w, dry, TD 4,700 ft., elev. 160 ft.

San Luis Obispo County, Cuyama Valley area: Richfield Oil Corp. 56-32 F. R. Anderson, dry, TD 4,824 ft., elev. 1,844 ft.

Tulare County, Porterville area: Congress Petroleum Co. 1 Congress, 22-22s-27e, dry, granite 1,200 ft., TD 1,300 ft., elev. 528 ft.

Deer Creek area: Mid-Valley Corp. 2 Hudson-Fay, 24-22s-27e, dry, granite 515 ft., TD 900 ft., elev. 433 ft.

Ventura County, Padre Canyon area: Continental Oil Co. 1-A Continental-C. C. M. O.-Hobson, 22-3n-24w, dry, TD 8,648 ft., elev. 260 ft.

Shiells Canyon area: Simian Oil Co. 2 Simian Kerr, 20-3n-19w, dry, TD 567 ft., elev. 1,003 ft.

Yolo County, Rairfield Knolls area: Shell Oil Co. 1-33 Corcoran, 33-9n-1e, dry, Hooper sand 3,736 ft., TD 3,756 ft., elev. 110 ft.

Mississippi

Adams County Wildcat Tests New Wilcox Pay

JACKSON.—Production test has been run at Kemp Drilling Co.'s new Wilcox discovery located in the city limits of Natchez in Adams County. Casing was set to 4,465 ft. and perforated above and below the possible productive zone and squeezed. Pipe was then perforated at 4,403-05 ft. and test was run using $^{3}/_{8}$-in. bottom and $^{1}/_{4}$-in. top chokes and 1,000-ft. water cushion. On 5-hour test, the well flowed 28 bbl. of oil on various chokes with top pressure 500 to 550 psi. Operator is still testing the well.

In Perry County, Union Producing Co. has run a 30-minute drill-stem test at its promising wildcat, A-1 B. M. Stevens, 19-4n-9w, which encountered faulting in the lower part of the Wilcox. Drill-stem test was run at 7,083-95 ft., using $^{3}/_{8}$-in. bottom and $^{1}/_{4}$-in. top chokes, with recovery being 110 ft. of 14 to 15°-gravity oil and 10 ft. of mud. No water was recovered on the test. Coring also revealed a sand showing oil between 7,069-79 ft. Hole is bottomed at 7,095 ft. and operator is preparing to core ahead.

Final completion has been made on the discovery well for North Lessley field, John Brook, Jr., and Petersen Drilling Co. 1 Louis Wax, C NW NE 36-3n-3w, Wilkinson County. After installing pump, the well was completed for 250 bbl. of 32.9°-gravity oil daily through perforations in the Wilcox at 7,299-7,304 ft. To date, no confirmation test has been staked to this discovery.

In Pickens field, Yazoo County, Carter Oil Co. 2 R. M. Bridgeforth, NW SW 30-12n-3e, northwest diagonal offset to the Lower Cretaceous discovery for the field, had top of sand at 7,671 ft. A total of 4 ft. of shaly sand and 11 ft. of clean sand carried shows of oil from 7,671-88 ft. Operators are now preparing to run a drill-stem test. Both the west and northeast offsets to the Lower Cretaceous discovery, Carter 1 Wilson, were dry holes.

MISSISSIPPI WILDCAT FAILURES

Adams County: R. J. Bartlett, et al, 1 Pierce Butler, 9-5n-3w, dry, TD 6,754 ft.

Humble Oil & Refining Co. B-1 James S. Giles, et al, 27-7n-3w, dry, TD 10,257 ft.

Jefferson County: G. A. Clements, et al, 1 Jake & Loulie Wagner, 24-8n-2e, dry, TD 6,755 ft.

Madison County: Carter Oil Co. 1 G. L. Crawford, 7-7n-2e, dry, TD 5,567 ft.

Walthall County: Humble Oil & Refining Co. B-1 P. H. Enochs, 21-3n-11e, dry, TD 10,295 ft.

ALABAMA WILDCAT FAILURE

Clarke County: James L. Duffy-Jack Barrington 1 R. H. Oswell, 5-5n-5e, dry, TD 5,631 ft.

CONTACT YOUR FAVORITE SUPPLY HOUSE

PARMACO
The House of Courteous Service

For
PACKERS
• • •
CASING AND DRIVE SHOES
• • •
CASING HEADS
• • •
We invite you to STANDARDIZE ON
PARMACO

PARKERSBURG MACHINE COMPANY
PARKERSBURG, W. VA.

INFERNO

OIL BURNER

- Uses any gravity fuel at any pressure.
- Works on steam or air pressure.
- Will not clog.
- Fires anything from small rivet-heating furnace to 150 H. P. boiler.

See your favorite supply store, or contact us direct. Write for Bulletin 13-B.

The INFERNO Co.
Box 1138A
115 RICOU ST.
SHREVEPORT, LA.

Kansas

Gove County Discovery Gets Maximum Oil Rating

CITIES SERVICE OIL CO. has completed its Gove County discovery well with a maximum state potential rating (3,000 bbl. per day). The well, 1 Coberly, NW SE SE 15-14-29, southwest of the town of Gove, and that far-western Kansas County's first oil well, pumped 180 bbl. of 30.5°-gravity oil on a 10-hour production test. Production is from the Marmaton lime with casing perforated opposite a zone at 4,287-98 ft. Hole had been plugged back to 4,300 ft. from previous perforations lower in the same pay at 4,304-10 ft., where the well had pumped some water with the oil. Original total depth was 4,644 ft. in Arbuckle lime. Nearest other production is more than 25 miles to the southeast in the small Arnold pool, in Ness County.

The Kansas side, in Seward County, of the two-state Light field is getting its second well. J. M. Huber Corp. 1 Fees, C NE NW 14-35-32, flowed at the rate of 11,257,000 cu. ft. of gas per day in a 5-hour test through 38/64-in. choke. The gas carried a good spray of distillate. Flowing pressure on the tubing increased from 990 psi. at the start of the test to 1,075 psi. at the end. Casing pressure increased from 1,480 to 1,495 psi. Production is from the Morrow sand, topped at 5,942 ft. (—3,199 ft.) and opposite which casing is perforated at 5,942-68 ft. Casing had been run to 6,122 ft. in hole drilled to 6,126 ft.

Location of the new well is about ½ mile south of Jomilson Producers, Inc., 1-B Light, discovery well on the Kansas side of the pool, which was completed as a maximum oil well from the same section. That well flowed at the rate of 28 bbl. of oil per hour with an estimated 47,571,000 cu. ft. of gas per day. Two large gas-distillate wells have been completed about 1½ to 2 miles to the south on the Beaver County, Oklahoma, side of the area.

Testing continues at Willis L. Hartman's prospective wildcat oil producer 3 miles east of the north end of the Hugoton gas area in northwestern Finney County. On latest reported test, the prospective producer, 1 Damme, SE SE NW 21-22-33, swabbed 4½ bbl. of oil per hour from casing perforations at 4,630-32 ft. near the top of the Mississippian. Operators have been testing a succession of intervals starting from the bottom of the hole at 3,805 ft. Best showings remaining to be tested were logged in the Marmaton lime (Pennsylvanian) zone at 4,417-30 ft.

Lion Oil Co. is opening a new pool in Kingman County at its 2 McMichael, SE SE SW 13-27-10w, which swabbed 33 bbl. of net oil during the first hour in starting tests of its prospective Viola lime pay zone. Water was estimated between 5 and 6 bbl. per hour. Top of the Viola is 4,265 ft. (—2,538 ft.). Casing, run through the zone to 4,350 ft., is perforated opposite an interval at 4,270-78 ft. Bottom of the hole is in Arbuckle lime logged at 4,455-70 ft. (surface elevation 1,727 ft.). The location is about 4½ miles northeast of the Cunningham pool. It is about ¼ mile southeast of 1 McMichael, Lion's first test in the area, drilled in 1945. It had showings in the Viola but did not produce.

KANSAS SUCCESSFUL WILDCATS

Chase County: Morrison 2 Norton, SW SW SE 36-20s-8e, pumped 12 bbl. oil from 1,823-36 ft., TD; lime 1,475 ft., Lansing-Kansas City 1,495 ft.

Kingman County: Smith et al 1 Foley, SW SW NW 15-28s-5w, pumped 1 bbl. oil from Mississippi dolomite at 3,812-20 ft., TD 3,876 ft., Lansing-Kansas City 2,995 ft.

Rooks County: Jones-Shelburne & Farmer 1 Lynd, SE SE SE 32-9s-19w, pumped 79 bbl. oil from Arbuckle at 3,750-57 ft., TD; anhydrite 1,600 ft., Heebner 3,396 ft., Toronto 3,418 ft., Lansing-Kansas City

The trend is toward
ASPHALT ANTI-STRIPPING ADDITIVE
. . . added at the refinery

Be prepared to supply treated Road Oils, Cut-backs, and other asphalt products on demand.

Use DARAKOTE

the anti-stripping additive that is chemical-engineered for refinery use.

***DARAKOTE** makes it possible for liquid bituminous materials to adhere to wet, moist or dry aggregates . . . prevents stripping under adverse conditions of moisture and low temperature. **DARAKOTE** actually displaces water; it binds asphalt to the aggregate and to the road surface.*

To the refiner, ***DARAKOTE*** offers many advantages. ***DARAKOTE*** is easy to handle, is pourable and pumpable at lower working temperatures. ***DARAKOTE*** retains its effectiveness under heat, will not settle out or deteriorate in processing, storage, or use. ***DARAKOTE*** is uniformly efficient. Modern manufacturing methods incorporate close quality control, and every batch is tested. ***DARAKOTE*** is economical to use. Its cost is extremely low per treated gallon of bituminous material.

Dewey and Almy Chemical Company | Cambridge 40, Mass. Chicago 38 San Leandro, Calif. Montreal 32

Scott Air-Pak (TRADE MARK)

ALLOWS ALL OF US TO SLEEP BETTER AT NIGHT AT WYOMING'S TRIGOOD OIL CO."

Scott Air-Paks . . . SAFETY INSURANCE AGAINST TOXIC FUMES

"The knowledge of and experience with the Scott Air-Pak enables us to sleep better at night even though four men or more are always in contact with sour . . . gas in the field," says J. R. McMinn, District Superintendent at Trigood.

Trigood is only one of many oil and gas companies who are protecting personnel and economizing on costs by using famous Scott Air-Paks to provide positive breathing protection against toxic petroleum vapors. Simple to operate, Scott Air-Paks provide refreshing supplies of air in any volume required by the individual user. Several models to choose from. Write for Bulletin No. 510 or see your Scott dealer now.

ESTABLISHED IN 1932 Scott FOR SAFETY—FOR SERVICE

Over forty-five American and Foreign Oil Companies now use Scott Air-Paks in their operation.

SAFETY EQUIPMENT DIVISION
SCOTT AVIATION CORP.
221 ERIE ST., LANCASTER, N. Y.
CANADA: SAFETY SUPPLY CO. BRANCHES IN ALL PRINCIPAL CITIES
EXPORT: SOUTHERN OXYGEN CO., 157 Chambers St., New York 7, N. Y.

3,433 ft., Marmaton 3,658 ft., Sooy 3,678 ft.

Rush County: Brack 1 Thalheim, SE SE NW 28-19s-16w, flowed 65 bbl. oil from Arbuckle at 3,800-03 ft., TD; anhydrite 1,135 ft., lime 3,467 ft., Lansing-Kansas City 3,482 ft.

Stafford County: Omega 1 Fischer, CEL NW NE 8-21s-13w, pumped 15 bbl. oil from Arbuckle at 3,586-93 ft., TD 3,625 ft., old dry hole worked over.

Armer 1 Willinger, NW NW SE 12-22s-12w, pumped 386 bbl. oil from Arbuckle at 3,601-11 ft., TD; anhydrite 570 ft., Heebner 3,079 ft., Lansing-Kansas City 3,235 ft., Sooy 3,507 ft.

Trego County: Pyramid 1 Schoenthaler, SE SW SE 26-12s-22w, pumped 1,397 bbl. oil from Arbuckle at 3,966-90 ft., TD; anhydrite 1,675 ft., Topeka 3,337 ft., Heebner 3,539 ft., Lansing-Kansas City 3,573 ft.

KANSAS WILDCAT FAILURES

Barton County: Francis 1 Batt, NW SE SE 26-16s-14w, dry, TD 3,453 ft.

Petroleum, Inc. 1 Rief, SE NE NW 1-17s-13w, dry, TD 3,258 ft.

Derby 1 Demel, NW NW NW 17-17s-14w, dry, TD 3,460 ft.

Hartman 1 Taylor, SE SE NW 29-19s-12w, dry, TD 3,568 ft.

Hexagon-Franco Central 1 Lanterman, SE SE NE 8-20s-12w, dry, TD 3,455 ft.

Butler County: Holcomb 1 Fittsworth, CSL S½ NW 21-29s-4e, dry, TD 2,755 ft.

Cowley County: Carter 1 Radcliffe, SW SE SW 32-32s-7e, dry, TD 2,851 ft.

Ellis County: Sunray 1 Herman, SE SE SE 10-14s-20w, dry, TD 3,859 ft.

Ellsworth County: Alpine 1 Long, NE NE NW 34-16s-8w, dry, TD 3,375 ft.

Lindas 1 Rolff, SW NE SW 18-17s-8w, dry, TD 3,306 ft.

Graham County: Cook-Galloway 1 Shaw, SE SE NW 7-9s-21w, dry, TD 3,856 ft.

Harvey County: Rupp 1 Greeley, SW SE NW 21-22s-1e, dry, TD 3,637 ft.

Marshall County: Falcon-Seaboard 1 Blaney, NE SW SW 3-5s-7e, dry, TD 2,571 ft.

Ness County: Imperial 1 Amstutz, SW SE SE 10-17s-24w, dry, TD 4,573 ft., Heebner 3,846 ft., Lansing-Kansas City 3,868 ft., Ft. Scott 4,397 ft., Mississippi lime 4,514 ft.

Gore 1 Bruntz, SW SW SW 15-19s-21w, dry, TD 4,492 ft., Topeka 3,407 ft., Heebner 3,739 ft., Toronto 3,767 ft., Lansing-Kansas City 3,785 ft., sand 4,284 ft., Sooy 4,351 ft., Mississippi lime 4,387 ft.

Pawnee County: Iron et al 1 Jennings, NE SE SW 10-22s-16w, dry, TD 4,056 ft.

Phillips County: Stearns et al 1 Wiltrout, NW NW SW 26-5s-20w, dry, TD 3,667 ft.

Rooks County: Deep Rock 1 Loeffler, NW NW SE 6-7s-20w, dry, TD 3,810 ft.

Sedgwick County: Drillers Gas 1 Petrie, SE NW NW 35-26s-1w, dry, TD 3,558 ft.

Stafford County: Lynn 1 White, SW SW NW 26-21s-11w, dry, TD 3,520 ft.

Black Cat 1 Mellies "B," NE NE SE 31-21s-11w, dry, TD 3,606 ft.

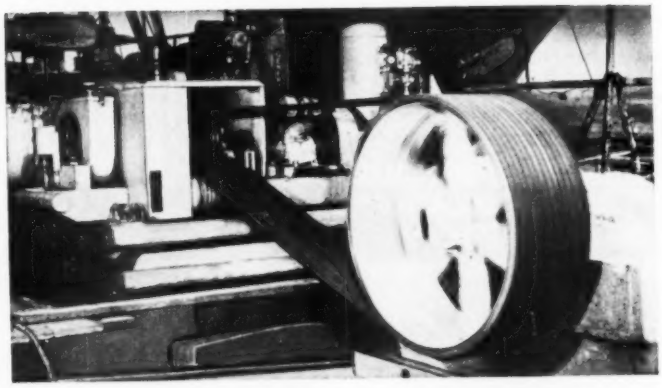
Westgate-Greenland 1 Asher, NE NE NW 9-21s-14w, dry, TD 3,680 ft.

Musgrove 1 Smith, NE NE SE 8-23s-13w, dry, TD 3,980 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Richardson County: Polinski 1 Tichen, CSL SW NW 16-1n-15e, dry, TD 2,686 ft.

Gilmer has the PULL



PULLING POWER with a big PLUS!

For the most rugged oil field service, you can always count on the husky pulling power of Gilmer Multiple V-Belts. This is assured by Gilmer firm-gripping side wall construction and the extra strong Rayon pulling cords which are processed for stretch control.

You can count on more: with pulling cords individually cushioned in live rubber and locked in parallel, you get cool running, smooth flexing, uniform belt performance. And the tough, multiple jackets help keep Gilmer V-Belts on the job day after day . . . for a long, long time.

Write for FREE copy of the fact-packed Gilmer V-Belt Guide.
And for top-quality transmission, always specify Gilmer V-Belts.

BUY THROUGH YOUR GILMER DISTRIBUTOR

Bovaird Supply Co. Globe Sales Co.
Wilson Supply Co.

L. H. GILMER COMPANY

509 Tacony, Philadelphia 35, Pa.

Division of United States Rubber Company

Gilmer BELTS

V-BELTS • FLAT BELTS • HOSE • PACKING • TAPE

Michigan

Wildcats Log Oil and Gas Shows in Montcalm County

MOUNT PLEASANT.—Montcalm County was drawing considerable interest this week as two wildcats and a potential extension on the northwest edge of the Bloomer Traverse field, showed encouraging oil and gas pay zones.

In Douglas Township, W. R. Swetland (Howard Atha, et al) 1 Carlson, SE SE SW 26-11n-7w, showed gas in 1½ minutes and flowed oil from the Traverse in 6 minutes on drill-stem test. Traverse (Alpena) was logged at 2,933 ft. and oil pay, crystalline dolomite, was drilled from 2,970-75 ft. Drill-stem test was run from 2,966-75 ft. Tool showed 167 ft. of oil and 3 ft. of salt water after the 8-minute test. Bottom-hole pressure built up to 1,460 psi. in 20 minutes. Wildcat was being drilled on to Dundee to test that zone before running casing and perforating the Traverse pay. Well was reported to be about 24 ft. lower on the Traverse than nearest and highest correlating dry-hole control point.

In Pine Township, a Stray sand gas pay was logged at Moco 1 Allen, SW NE SE 9-11n-8w. Wildcat gaged 2,110,000 cu. ft. of gas from pay logged from 1,247-53 ft. Wildcat, originally scrediuled to be drilled to the Dundee as an oil test, was being saved for completion as a Stray gas discovery after further tests.

On the northwest edge of the Bloomer Traverse oil pool, H. E. Walton logged an Alpena Traverse oil pay at the A-1 Wright, NW NW NE 36-9n-6w, Bushnell Township, which appeared to be good for 25 bbl. of oil a day natural. Well was being prepared for acid treatment. This well may extend the Bloomer Traverse reef pool further to the northwest. Walton had the north 10-acre offset location staked for immediate drilling. Traverse pay was logged at 2,644-45 ft. after top of chert was picked at 2,634 ft. Hole was bottomed out at 2,645 ft., and well showed 1,700 ft. of oil and gas in 18 hours, and flowed from 25 to 30 bbl. of pits during the first 24 hours. If this well responds to acid treatment in a typical Bloomer field manner, well may flow at 10 bbl. an hour or more.

MICHIGAN SUCCESSFUL WILDCATS

Oceana County, Golden Township: McClure Oil Co. 1 Forestry Association, NE NE SW 35-15n-18w, Traverse 1,742 ft., 50 bbl. after acid, TD 1,746 ft. (Shallower horizon discovery, Mears field).

MICHIGAN WILDCAT FAILURES

Allegan County, Watson Township: Bradley & Davidson 1 Wieck, NW NE NE 7-2n-12w, Traverse 1,662 ft., dry, TD 1,669 ft.

Saugatuck Township: Wm. C. Vandenberg, Jr. 1 Van Dragt, NE SW SE 25-3n-16w, Traverse 1,385 ft., dry, TD 1,632 ft.

Gratiot County, Arcada Township: Michigan Oil Co. 1 Terpenning, NW NW NE 19-11n-3w, Dundee 3,231 ft., dry, TD 3,271 ft.

Eastern Texas

Lease Play Spurred By Distillate Discovery

DALLAS—R. J. Caraway's Rains County discovery has apparently spurred leasing activity there. The Texas Co. was reported adding to its holdings, paying a bonus of $25 an acre for land in the area 8 miles southwest of the town of Emory in P. P. Woodberry Survey.

Union Producing Co. was said to have acquired part interest in the 1,243-acre Hodge lease in T.P.R.R. Surveys 275, 277, and 279, for a bonus of around $15 per acre. Phillips Petroleum Co. was reported active in the J. Fisher Survey, 6 miles southwest of Emory.

The Texas Co. was reported about ready to start work on a Harrison County wildcat 2 miles east of Longview, which will test to the Travis Peak or deeper. Tentative location was on the 140-acre R. E. Latham lease in James Hill Survey.

Humble Oil & Refining Co. 1 Mattie McAdams, wildcat in the M. Autrey Survey east of Dew in Freestone County, was drilling below 9,357 ft. in shale and sand following a drill-stem test from 8,947-81 ft. Recovery in 64 minutes was 90 ft. of oil-cut mud. The section tested was the Pettit, topped at 8,829 ft.

Humble 1 J. J. Taylor, 3 miles east of the Woodlawn field in Harrison County, was waiting orders at total depth of 6,890 ft. Drill-stem test from 6,747-6,890 ft. recovered 140 ft. of mud and 400 ft. of salt water. Tests of the Pettit, higher in the hole, have shown some gas recovery.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCATS

Grayson County: L. O. McMillan 1 Rich, R. H. Armstrong Sur., ½ mi. N Sandusky, TD 8,237 ft., elev. 699 ft., Oil Creek 8,210 ft., pay 8,233-36 ft., IP flowed 426 bbl. 39°-gravity oil a day, 12/64-in. choke, TP 1,665 psi., GOR 1,441:1.

Rains County: R. J. Caraway 1 H. L. Puckett, J. R. Dyer Sur., 4 mi. SE Emory, TD 12,602 ft., Buckner, (tentative), 11,914 ft., perforated in limestone 11,964-12,126 ft., IP approximately 3,000,000 cu. ft. gas daily, ¼-in. choke, plus 6 bbl. 55°-gravity distillate an hour, TP 3,096 psi.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Anderson County: The Texas Co. 1 Mary Barry, J. Madden Sur., dry, TD 5,047 ft., elev. 309 ft., Woodbine 4,755 ft., Buda 5,017 ft.

Falls County: Ashier & Jones 1 R. C. Avery, Pedro Zarza Sur., dry, TD 938 ft., Buda 840 ft., Georgetown 938 ft.

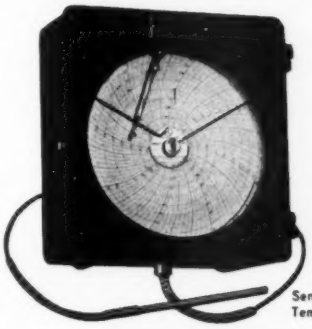
W. P. Luse 1 J. W. Bergin, N. McLennan Sur., dry, TD 3,225 ft., Woodbine 1,685 ft., Buda 1,784 ft., Georgetown 2,051 ft.

H. E. Rains 1 J. B. Scott, P. Ferrell Sur., dry, TD 1,114 ft., elev. 514, ft., Buda 860 ft., Edwards 1,080 ft.

Upshur County: Stanolind Oil & Gas Co. 1 M. N. Irwin, R. Asher Sur., dry, TD

AUTO-LITE

TEMPERATURE RECORDERS



For your specific needs!

★ Precision-built recorders provide money-saving proof of temperature behavior.

★ Low-cost protection . . . due to large scale, specialized production.

★ Wide selection of chart ranges.

★ 3 standard types; choice of 24 hour or 7-day movement.

Send for catalog showing Auto-Lite Temperature Recorders and Indicators.

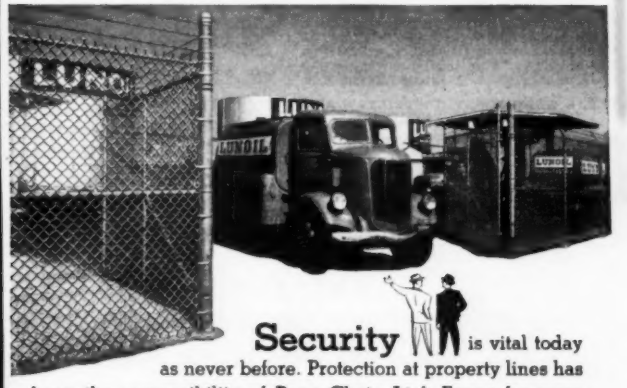
Model "500" Temperature Recorder. Priced from $42.50.

THE ELECTRIC AUTO-LITE COMPANY
INSTRUMENT AND GAUGE DIVISION
TOLEDO 1, OHIO
NEW YORK • CHICAGO • SARNIA, ONTARIO

INDICATING & RECORDING THERMOMETERS

PAGE FENCE - *Since 1883*

• AMERICA'S FIRST WIRE FENCE •



Security is vital today as never before. Protection at property lines has been the responsibility of Page Chain Link Fence for more than 60 years. There are fence styles and gates to meet any protective need. The expert erecting firm near you will supply facts and submit cost estimates without obligation. Firm name will be sent with fence data on request.

Write to PAGE FENCE ASSOCIATION in Monessen, Pa., Atlanta, Bridgeport, Chicago, Denver, Detroit, Los Angeles, Philadelphia, New York or San Francisco.

PRODUCT OF PAGE STEEL & WIRE DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC.

13,067 ft., Travis Peak 7,870 ft., Cotton Valley 9,284 ft., Smackover 12,007 ft.

Van Zandt County: Deupree & Jackson 1 H. A. Godwin, J. P. Henderson Sur., dry, TD 5,430 ft., Woodbine 4,644 ft.

Texas Gulf Coast

Live Oak County May Have New Gas Discovery

HOUSTON.—Howeth & Mason have a possible new gas discovery in southeastern Live Oak County at 1 Sanger Estate, GC&SF RR Co. Survey 385, Abstract 637. Operators are setting 5½-in. casing at total depth of 2,716 ft. after running drill-stem test. Through perforations at 2,639-51 ft., using ¼-in. chokes, the well developed 520 psi. working pressure while flowing dry gas.

First completion attempt is under way at Sinclair Oil & Gas Co. 1 Bess Henry, William Gates Survey, Abstract 46, 10 miles northeast of Chapel Hill in Washington County. The wildcat was drilled to 11,513 ft. operator set 5½-in. casing at 9,540 ft. and is testing in perforations at 9,422-28 ft. The well had oil shows at 9,200 ft. and 9,417-57 ft.

In northeast Harris County, Sun Oil Co. has potentialed 2 K. Tharp, Frederich H. Rankin Survey, Abstract 57, for 101 bbl. of 37.3°-gravity oil daily. Production was through perforations at 8,703-18 ft. Operator drilled the well to a total depth of 8,953 ft. and set 5½-in. casing on bottom. Tubing pressure on the test was 1,025 psi.

Shell Oil Co. has run potential gage on 1 A. J. House, southwest extension well at Helen Gohlke field in eastern DeWitt County. Through perforations in the Wilcox at 8,164-76 ft., the well flowed 173 bbl. of 33°-gravity oil daily through ⅛-in. choke. This extension well is located in T&NO RR Co. Survey 9, Abstract 549, 2,650 ft. southwest of Shell B-2 Gohlke.

P. R. Rutherford 1 William Avery, gas discovery well approximately 1½ miles southwest of McFaddin field in Refugio County, made an estimated 75,000,000 cu. ft. of gas daily on open-flow potential. Production is through perforations at 2,272-87 ft. Gage was based on test through ⅜-in. choke when the well flowed 3,220,000 cu. ft. of gas daily and 4,200,000 cu. ft. through 7/64-in. choke. This new discovery is located in Edward Perry League, Abstract 40.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Bee County: New pay at South Blanconia—Bridwell Oil Co. A-4 H. C. Wood, James McGeehan Sur., A-38, TD 5,329 ft., open hole 5,326-29 ft., IP: 66 bbl. oil per day, 3/32-in. choke.

New pay at Sliva—Miller Wells, Inc., 1 Lado Muhlstein, et ux, Jackson M. Reed Sur., A-481, TD 4,480 ft., perf. Vicksburg 4,400-06 ft., IP: gas well, no gage.

Colorado County: Gas discovery—Houston Oil Co. 1 Duncan, James Ross Sur., A-39, TD 9,597 ft., perf. 9,316-26 ft., 9,354-66 ft., and 9,375-77 ft., IP: 736,000 cu. ft. of gas per day plus 30 bbl. of condensate per million cubic feet.

Colorado County: Gas-condensate discovery Superior Oil Co. D-1 Tait, John Byrne Sur., A-10, TD 12,775 ft., perf. 10,715-44 ft., IP: 30 bbl. condensate per day plus 1,860,000 cu. ft. of gas, 49.2° gravity, perf. 10,205-27 ft., IP: 17 bbl. condensate and 640,000 cu. ft. of gas, 49.3° gravity.

Harris County: Oil discovery—Sun Oil Co. 2 K. Tharp, Frederich H. Rankin Sur., A-57, TD 8,953 ft., perf. 8,703-17 ft., IP: 101 bbl. oil per day, 8/64-in. choke, TP 1,050 psi., 37.3° gravity.

Liberty County: Gas-condensate discovery General Crude Oil Co. C-2 Esperson, Geo. Pace Sur., 6 mi. SW of Dayton, TD 10,190 ft., perf. 8,957-61 ft., IP: 21,400,000 cu. ft. of gas per day plus 57 bbl. condensate.

Live Oak County: Gas discovery—Delhi Oil Corp. 1 R. C. Lyne, SE¼ Sec. 91, Dr. C. F. Simmons Farm Lots Subd. 159, TD 7,718 ft., perf. 7,420-40 ft., IP: 17,000,000 cu. ft. of gas per day, ¼-in. choke, TP 2,250 psi.

Matagorda County: Gas discovery—Brazos Oil & Gas Co. 2 State of Texas "X-A," State Tract 195, Matagorda Bay, TD 6,504 ft., perf. 2,655-85 ft., IP: 1,735,000 cu. ft. of gas per day, ¼-in. choke.

Victoria County: New pay at East McFaddin—Union Producing Co., et al, A-29 McFaddin, et al, Maria J. Traviesa Grant, TD 6,415 ft., perf. 5,222-23 ft., IP: 33 bbl. oil per day, 1-in. choke, TP 1,715 ft., 35.1° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Calhoun County: John W. Mecom 12 Minnie S. Welder, Thos. Porter Sur., A-134, dry, TD 8,502 ft.

DeWitt County: Rowan & Hope 1 Fred Menn, J. D. Owen Sur., A-375, dry, TD 7,642 ft.

P. R. Rutherford, et al, 1 Stanley Kulawik, L. V. Criswell Sur., A-116, dry, TD 7,458 ft.

Fayette County: Oil Drilling Co., Inc., 1 Cherry, F. A. Bettinger ⅓ Lge., A-130, dry, TD 2,200 ft.

Harris County: J. R. Frankel 1 Johnson, HT&B Sur., A-1330, dry, TD 8,003 ft.

Jackson County: Lewis-Reynolds-Bakke 1 F. Ripple, Jemina Heard Sur., A-28, dry, TD 5,817 ft.

Live Oak County: Argo Oil Corp. 4 Brookshire, J. Poitevent Sur. 83, dry, TD 3,861 ft.

Argo Oil Corp. 1 E. O. Hamilton, Manuel Garcia Sur. 66, A-755, dry, TD 4,111 ft.

Newton County: Texas Gulf Producing Co. & Rowan Oil Co. 1 Hill, J. S. Whitaker Sur., A-878, dry, TD 7,985 ft.

Wharton County: Bolsa Chico Oil Corp., et al, 1 Kountze & Stewart, P. J. Poole 10 Sur., A-616, dry, TD 7,500 ft.

Rocky Mountain

Sussex Field Well Tests Tensleep Oil

DENVER.—Continental Oil Co. has cored and tested more than 137 ft. of saturated Tensleep sand at 59 Unit, SW NW SE 17-42n-78w, first test below the Sundance in Sussex field. The well topped the Tensleep at 9,090 ft. and is coring below 9,249 ft. On a drill-stem test at 9,115-29 ft., the well flowed in 50 minutes, and at 9,130-72 ft. it flowed oil in 77 minutes. Additional tests to the present drilling depth have shown oil, without flowing. The oil is 32° gravity, lighter than Tensleep oil in Salt Creek field, south of Sussex. This discovery is rated of major importance as Tensleep (Pennsylvanian) production has been comparatively small at Salt Creek and has not been productive in other fields in the southwestern part of the Powder River basin. In Sussex, Meadow Creek, North Meadow Creek fields there is now an estimated 3,000 acres productive in four Upper Cretaceous sands, and the important current question is whether or not Tensleep is effected by fault blocks aiding in production in the upper sands. In any event, Tensleep production in the present well indicates a sizable reserves for that formation. There have been a number of wildcat failures in all directions from these three fields and the present discovery again started active lease deals on fringe acreage around the fields. Continental scheduled the well as a test to Madison and may core through Tensleep for a test of that zone.

With the vast leasing campaign throughout the Williston basin two new wildcats in northeastern Montana will be of considerable interest. Shell Oil Co. has spudded its Richey area, Dawson County, wildcat, 1 Northern Pacific, SE NW NW 19-23n-50e, a deep test approximately 125 miles west of Amerada Petroleum Corp.'s recent North Dakota discovery. Shell has another unit along the large Baker-Glendive surface structure, and plans a well in this area in the near future. Both wells will be of considerable aid in subsurface study through the basin, where there have been few deep tests.

Amerada Petroleum Corp. has made location for 1 Pestal, C NW SE 17-18n-24e, in the Crooked Creek area, Fergus County, Montana. This well will be of importance as the first in the Blood Creek basin area. Seaboard Oil Co. is rigging up rotary for 43-22-State, NE SE NW 22-6n-18e, Ryegate area, Wheatland County. Pacific Western has location for 1 McCracken, C NE NE 18-29n-1w, in the Fowler area, Pondera County. The Texas Co. will drill a wildcat in the Pole Creek area, 1 Northern Pacific, NW NE 11-9n-22e, Golden Valley County.

In Wyoming, Stanolind Oil & Gas Co. is building roads for a 7,500-ft. Frontier sand test at 1 Pepper, CSL SW SE 23-55n-97w, in the Coon Creek area, Big Horn

FASTEST SERVICE TO

VENEZUELA

C&S NEW luxury

CONSTELLATIONS

Flights each way—every day

CHICAGO & SOUTHERN AIR LINES

GENERAL OFFICES MEMPHIS 2, TENN.

County. This wildcat is southeast of Garland field. Paul Stock will drill a wildcat in the Golden Eagle area, Hot Springs County, at 1 Cottonwood Land & Coal Co., NE NE NE 14-45n-97w, to go to the Tensleep at around 9,000 ft. The Texas Co. is drilling below 3,500 ft. at a wildcat, 1 Gould, SW SW SW 20-9n-52w, in the Padroni area, Logan County.

Nevada.—Standard Oil Co. of California and Continental Oil Co. abandoned their second venture in White Pine County, Nevada. The latest wildcat, 1 Hayden Creek unit in Section 17-15n-59e, reached a depth of 5,177 ft. after reportedly finding minor oil shows but none of commercial importance. The operators shortly will announce location for a third test.

NEVADA WILDCAT FAILURE

White Pine County, Hayden Creek area: Standard Oil Co. of Calif. and Continental Oil Co. 1 Hayden Creek unit, 17-15n-59e, dry, TD 5,177 ft.

WYOMING WILDCAT FAILURE

East Sussex, Johnson Count: Earl Mallette 2 Government, SW NW NW 9-41n-77w, TD 7,485 ft., dry, Lance Surface 4,240 ft., Fox Hills 4,312 ft., Mesaverde 5,559 ft., Parkman 5,990 ft., Steele 6,520 ft., Sussex 7,422 ft.

COLORADO WILDCAT FAILURES

Southwest Yenter, Logan County: Olds Oil Co. 1 Budame, SE NW SW 6-8n-54w, TD 4,457 ft., dry, Niobrara 4,416 ft., Muddy 5,270 ft., Dakota 5,380 ft.

Yuma County: B. B. Carter Drilling Co. 1 Brand-State, C SE NE 16-3n-47w, TD 4,003 ft., dry, Niobrara 2,675 ft., Carlile 3,145 ft., Greenhorn 3,304 ft., first sand 3,503 ft., Dakota 3,815 ft.

MONTANA WILDCAT FAILURE

Battle Creek anticline, Blaine County: Battle Creek Oil & Gas Co. 1 Holman-Montgomery, C SW SW 33-35n-19e, TD 4,220 ft., dry.

UTAH WILDCAT FAILURE

Blue Bell, Duchesne County: Carter Oil Co. and Stanolind Oil & Gas Co. 1 Unit, C SW NE 6-1s-2w, TD 12,518 ft., dry, Uintah 3,992 ft., Green River 7,895 ft., Wasatch 12,082 ft.

WESTERN NEBRASKA WILDCAT FAILURE

Cheyenne County: Williams 1 State, SW SW 36-17n-52w, TD 5,420 ft., dry, Niobrara 4,400 ft., Ft Hays 4,662 ft., Codell 4,740 ft., Greenhorn 4,920 ft., "D" sand 5,204 ft., "J" sand 5,350 ft.

Appalachian-Ohio

Deep Rock Stakes Wildcat On Clintonville Quadrangle

PITTSBURGH.—Deep Rock Oil Corp. has located 1 Bertha H. Thornbury et al, Clintonville Quadrangle wildcat in Williamsburg district, Greenbrier County, West Virginia. Eelevation is 2,240 ft.

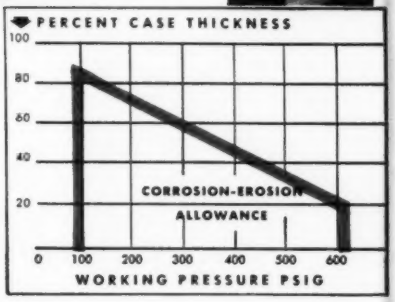
United Fuel Gas Co. has completed 14-6572 J. H. Copenhaver in Elk district, Kanawa County, West Virginia, for a gage of 11,476,000 cu. ft. of gas in 14 hours from Oriskany sand at 5,305-18 ft. The well logged Corniferous lime at 5,177 ft. and the Oriskany at 5,300 ft. Total depth was 5,318 ft. Rock pressure was 1,130 psi.

In Lincoln district, Wayne County, West Virginia, United Fuel's 52-6648 F. D. Caldwell gaged 1,309,000 cu. ft. of gas in the Maxton sand at a total depth of 1,273 ft.

In Leidy Township, Clinton County, Pennsylvania, Godfrey L. Cabot, Inc., 1 J. J. Levan gaged 12,500,000 cu. ft. of gas in 40 hours from Oriskany sand with a rock pressure of 3,760 psi. The Onondaga was logged at 6,329 ft., and the Oriskany at 6,355 ft. Total depth was 6,360 ft.

C. E. Fralich et al 2 State of Pennsylvania, Tract 2, came in for 4,500,000 cu. ft. of gas in 14 hours also from the Oriskany. Gas was coming from the interval 6,182-85 ft. at a rock pressure of 1,910 psi. Well

Nothing is left to chance...



when you specify

Pacific Precision Built

HEAVY DUTY PROCESS PUMPS

... pumps that are custom built to provide a more-than-adequate margin for safe operation even where high pressure, extreme temperature and corrosion, may all be predominant factors. The chart illustrates graphically the margin of safety that Pacific builds into Process Pumps. For example: Chart above for a large pump shows that at 625 PSIG working pressure and 800° F. temperature a 20% margin of safety is provided; at 300 PSIG a 61% margin of safety is provided at the same temperature. Other readings are clearly indicated. Thus your choice is proved sound before your okay to purchase a Pacific Process Pump appears on the specifications.

Pacific Pumps inc.
ONE OF THE DRESSER INDUSTRIES
HUNTINGTON PARK, CALIFORNIA
Export Office: Chanin Bldg., 122 E. 42nd St., New York
Offices in All Principal Cities

PACIFIC Precision Built PUMPS

PR-11

found the Onondaga at 6,158 ft. and the Oriskany at 6,179 ft. Total depth was 6,195 ft.

OHIO

COLUMBUS.—Ashland (Berea) field was extended ½ mile by a well completed by L. W. Getz et al. on 2 Ellen Smalley, Section 3, Perry Township. The Berea at 655-780 ft. had oil and gas showing all through the sand, and flowed 30 bbl. in 24 hours after shot. The operator has made another location, and several additional wells will be started on adjoining leases.

Fierbaugh and Ringler brought in a second gas well south of Butler in Worthington Township, Richland County. The well is on W. & E. Armstrong in Section 30, and is a north offset to the 1 Morgan. The sand at 2,381-86 ft. gaged 2,000,000 cu. ft. with 1,120 psi. when shut in after shot.

Mid East Co. extended New Castle pool in Coshocton County ¼ mile north with a 35-bbl. well on Robert Walters in Section 18. The Clinton sand at 3,288-3,309 ft. and 3,326-43 ft. made 5 bbl. of oil, natural, and was shot with 110 qt.

Wasson & Co. 6 Ray Berkshire, second quarter, Licking Township, Muskingum County, gaged 300,000 cu. ft. of gas natural, and 1,500,000 cu. ft. when shut in.

Canadian Fields

Gas Strike Indicated Northeast of Calgary

CALGARY.—A discovery of natural gas in an indicated large volume, with some naphtha content, has been made at Bailey-Olds 1, wildcat located 38 miles north and 8 miles east of Calgary. The strike has been made in a high-pressure zone 8,100 ft. deep, in the Devonian formation equivalent to the D2 section.

A. G. Bailey Co., Ltd., operator of the project which involves seven companies, reported on drill-stem test at Bailey-Olds 1 of D2 interval 8,090-8,114 ft. The valve was open 15 minutes. Four minutes after opening a natural-gas flow hit the surface, at a rate estimated at 6,000,000 cu. ft. daily, through a ⅜-in. choke. Flowing pressure was 3,200 psi. After tester was closed, shut in pressure of 3,400 psi. was recorded. Forty feet of fluid was recovered from the pipe, including 20 ft. of naphtha and 20 ft. of black sulfur water.

Coring is now being continued below 8,114 ft., and another drill-stem test will likely be run over the weekend, to better evaluate the prospects for the discovery zone. Location is in LSD 2, 18-31-27w4, 13 miles due east of Didsbury, and 15 miles southeast of Olds. Nearest previous Devonian discovery is at Big Valley, 55 miles to the northeast, where D2 and D3 zones are producing 32°-gravity crude oil plus gas. Devonian D2 is about 3,000 ft. shallower at Big Valley than at Olds.

The Wizard Lake wildcat has come through with its fourth discovery, this time a strike of crude oil and gas in the D3 zone of Devonian. The quadruple-zone discovery is owned 90 per cent by Texaco Exploration Co. and 10 per cent by McColl-Frontenac Oil Co., Ltd., who share several thousand acres surrounding the well in the same proportion. The well previously discovered natural gas in substantial volume in the Viking sand, and followed this up with indicated commercial oil discoveries in the basal Lower Cretaceous sands and Devonian D2 zone.

The discovery is in LSD 12, 22-48-27w4, about 5 miles southwest of the producing limits of the Calmar sector of Leduc oil field. The Wizard pay zones are several hundred feet lower in elevation than the D2 and D3 pays of the main field. Official data show top of the latest discovery zone, D3 Devonian, at an elevation some 395 ft. lower than the elevation of D3 oil-water interface in the main portion of Leduc, and over 250 ft. lower than the D3 contact at a South Calmar oil discovery well.

D3 Devonian zone was contacted at 5,073 ft., or 3,415 ft. subsea. The D3 discovery drill-stem test was run from 5,978-84 ft., with the valve open 1 hour. A flow of natural gas, with an estimated volume of 500,000 cu. ft. daily, hit the surface in 6 minutes, and oil flowed in 51 minutes. When pipe was pulled it contained 1,400 ft. of clean oil, plus 50 ft. of drilling mud, no water. The hole is currently bottomed at 5,984 ft., and crew is running protective string of 7-in. casing prior to drilling ahead in the D3 zone.

Trans Empire Oils, Ltd., and Phillips Oil, Ltd., Canadian independents, have found a D2 Devonian section that has yielded a large volume of natural gas, plus some oil and distillate, during drill-stem tests run this week. The crew is continuing below 5,469 ft., although bottom of the hole is now 18 ft. below the contact water line at a D2 oil producer offsetting it to the west. The well, Trans-Empire-Phillips 2 is in LSD 9, 13-49-27w4, ¼ mile east of the team's 1 D2 oil well.

The first D2 test was run from 5,400-09 ft. for 15 minutes, with a maximum natural gas flow rate of 6,000,000 cu. ft. daily. Pipe recovery was 180 ft. of gassy mud. A later test was run from 5,462-69 ft. for 75 minutes. The well flowed distillate plus a thin spray of oil in 56 minutes, and recovery was 780 ft. of clean oil in 75 minutes. Top of the D2 zone was approximately 5,397 ft., around 18 ft. higher than at the first well. Company engineers estimate about 42 ft. of gas zone has been opened to bottom 5,469 ft. Coring and testing is being continued.

CANADIAN WILDCAT FAILURE

Bailey-Vegreville 1, LSD 1, 15-52-12w4, TD 3,520 ft.

Permian Basin

Oil Shows Reported at Wildcat West of Midland

MIDLAND.—Ralph Lowe 1 Fasken, 1 mile west of here, had gas and recovered oil on a drill-stem test identified as between the Wolfcamp and the Pennsylvanian.

Operators were drilling ahead following the 7-hour test from 10,199-10,316 ft. in a shaley section. Gas showed in 3 hours and 55 minutes and recovery was 90 ft. of oil plus 230 ft. of oil and gas-cut mud. Good oil shows were reported logged in the Spraberry between 8,725-8,800 ft.

In northeast Midland County, Murphy Corp. and Husky Oil Co. 1 Fasken was swabbing around 22 bbl. of oil a day after treating with Hydrafrac in Spraberry section topped at 7,228 ft. on elevation of 2,690 ft. Location is southwest of production in Germania field.

In southwest Martin County, Gulf Oil Corp. 2-EB Glass prepared to plug back to the Silurian after finding salt water in the Ellenburger. Total depth was 12,661 ft. According to field reports, it was not expected to make a well in the Silurian, but had good shows while drilling. After testing it will back up the hole to the Pennsylvanian which made a flow of oil at 10,412-521 ft. The well also had some shows in the Spraberry.

A 1-mile south extension was added to Adair Wolfcamp field of Terry County at Amerada Petroleum Corp. 3 Hogan, which completed for a daily potential of 995 bbl. of oil. Production was through ⅜-in. choke from open hole at 8,490-8,540 ft.

Blackwood & Nichols, Tulsa, made location for a northeast offset to its 1 Mrs. James Weddell as rig was released from the latter and tanks were set to run tests. The 1 Weddell set casing to 7,145 ft., drilled out to 7,185 ft. and prepared to make production tests on the Spraberry. Top of the sand was 6,310 ft., and minus 3,654 ft.

Sinclair Oil & Gas Co. was to start drilling immediately at a new 12,700-ft. Ellenburger wildcat, 6 McElroy Ranch, in 132-D-CCSD&RGNG Survey, about 3½ miles north of the 1 McElroy Ranch which has been completed from both the Pennsylvanian and the Ellenburger.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Andrews County: Anderson Prichard Oil Corp. 1 Fasken J-26, 26-41-1n-G&MMB-&A, TD 4,775 ft., elev. 3,016 ft., pay 4,657 ft., IP 298 bbl., 34° gravity, GOR 180:1.

Shell Oil Co. and The Texas Co. 12 Ratliff & Bedford, 4-73-PSL, TD 9,895 ft., elev. 3,216 ft., pay 9,702 ft., IP 626 bbl. 41°-gravity oil a day, 32/64-in. choke, TP 200 psi., GOR 400:1.

Borden County: Shell Oil Co. 2 Sterling, 70-25-H&TC, extension to Von Roeder field; TD 6,717 ft., elev. 2,232 ft., reef 6,600 ft., pay 6,600 ft., IP 2,008 bbl. 46°-gravity oil a day, 32/64-in. choke, TP 1,100 psi., GOR 897:1.

Pecos County: Wood River Oil & Gas Co. 1 J. Williams, 4-3-H&TC, TD 5,204 ft., pay 5,176 ft., IP 423 bbl. 43°-gravity oil a day, 16/64-in. choke, TP 700 psi., GOR 735:1.

Runnels County: Ted Weiner and Anton Oil Co. 2-A Jennings, Sec. 332, H&TC, TD 4,568 ft., elev. 1,781 ft., Caddo 4,435 ft., gas sand 4,151-60 ft., IP 4,000,000 cu. ft. of gas, open flow.

Sterling County: Parochial Petroleum Co. 1 Mrs. H. Bade, 22-22-H&TC, TD 1,113 ft., pay 1,097 ft., IP 23 bbl. 32°-gravity oil a day, pumping.

Upton County: Gustave Ring 1 F. F. Elkin, 19-37-T&P, TD 7,122 ft., elev. 2,720 ft., Spraberry 7,064 ft., IP 125 bbl. 38°-gravity oil a day, 22/64-in. choke, TP 60 psi., GOR 500:1.

Sinclair Oil & Gas 1 McElroy Ranch, 129-D-CCSD&RGNG, TD 12,438 ft., elev. 2,791 ft., Ellenburger 12,008 ft., perforated 12,306-406 ft., IP flowed 1,681 bbl. 53°-gravity oil a day, open 2-in., TP 150 psi., GOR 776:1; later made second completion from Strawn at 9,365-9,405 ft., flowing 288 bbl. of 49°-gravity oil a day, 21/64-in. choke.

WEST TEXAS (DISTRICTS 8 AND 7-C WILDCAT FAILURES

Bailey County: Shell Oil Co. 1 W. E. Nichols, 13-212-Crosby CSL, dry, TD 9,051 ft., elev. 3,810 ft., Pennsylvanian 8,109 ft., pre-Cambrian 9,043 ft.

Conchoe County: Nash & Cook Oil Co. 1 Mrs. C. Wooten, 166-72-Mary Putnam Sur., dry, TD 3,575 ft., elev. 2,130 ft., Strawn 3,203 ft., Ellenburger 3,416 ft.

Progress Petroleum Co. 1 Marion Sanson Co., 328-72-T&NO, dry, TD 3,800 ft., Caddo 3,075 ft., Ellenburger 3,495 ft.

Crane County: Placid Oil Co. 1 M. S. Ingleright, 16-6-H&TC, dry, TD 3,315 ft.

Dawson County: James H. Snowden 1-35 Dean, 35-2-6n-T&P, dry, TD 8,733 ft., elev. 2,835 ft., Spraberry 6,630 ft., reef 8,664 ft.

King County: Addison Warner 1 W. R. Ross Ranch, 145-A-John B. Rector Sur., dry, TD 5,700 ft., elev. 1,497 ft., Canyon 4,032 ft., Strawn 5,182 ft.

Lubbock County: Standard Oil Co. of Texas 1 F. E. McNabb, 77-20-H&WT, dry, TD 11,156 ft., elev. 3,312 ft., Strawn 10,300 ft., Mississippian 10,500 ft., Ellenburger 11,130 ft.

Lynn County: Magnolia Petroleum Co. 1 Pearl Callaway, 6-10-EL&RR, dry, TD 6,762 ft., elev. 2,927 ft., Spraberry 6,095 ft., lower Spraberry 6,722 ft.

Midland County: Forest Oil Corp. 1 Pio Crespi, 17-3-2S-T&P, dry, TD 7,750 ft., elev. 2,717 ft., Spraberry 7,420 ft.

Pecos County: Hunt Oil Co. 27 Elsinore Royalty Co., 11-B-GC&SF, dry, TD 1,560 ft.

Reagan County: Continental Oil Co. 1 University-7, 7-7-University Lands, dry, TD 9,805 ft., elev. 2,857 ft., Spraberry 5,647 ft., Dean 6,912 ft., Devonian 8,810 ft., Fusselman 9,148 ft., Simpson 9,219 ft., Ellenburger 9,522 ft.

Humble Oil & Refining Co. 1-N Univer-

Flexible-type handles shown above, available as alternate equipment

MISSION Slips with rigid-type handles

MISSION "Super-Speed" Power Slips . . . "Rolling Dog" Slips mechanically operated

MISSION "ROLLING DOGS" *ENDED* SLIPPAGE AND STICKING

MISSION "Rolling Dog" Slips offer these advantages: *Positive Gripping*—no slippage or chatter—each dog rocks downward into firm contact. *Instant Release*—no sticking—each dog rocks freely up and back. *Protection of Pipe*—complete encirclement and support with cushioning grip—no cutting. *Greater Safety for Men*—positive, dependable operation reduces accidents. Available through all supply stores.

MISSION MANUFACTURING COMPANY
New York HOUSTON London

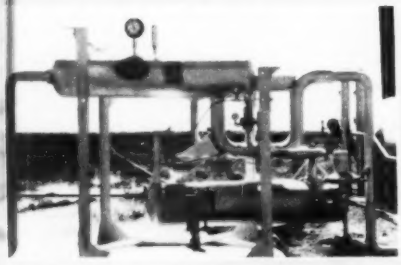
MISSION

G-202-A

The INDUSTRY'S GREATEST LINE-UP of PRESSURE EQUIPMENT

• PARKERSBURG EMULSION TREATERS are available in 5 series, 14 types and 4 sizes in each type. Each is completely described with full specifications and recommended applications in in our latest emulsion treater catalog. Write for your copy.

• PARKERSBURG HYRECO was the first proven unit for increasing condensate recovery and increasing earnings from high pressure wells by low temperature separation at the well head.



• PARKERSBURG HYDRACEPTER prevents gas line freezing by intercepting and removing free water from lines, thus preventing formation of hydrates.

• PARKERSBURG HORIZONTAL SEPARATORS have extra large shell diameter plus the exclusive No-Bleed Level Controller and improved internal elements which make them the most dependable and efficient separators available today.

• Leadership incurs an obligation to the industry we serve.

Parkersburg is fulfilling its obligation of leadership in pressure equipment by continuous improvement in treaters, heaters, separators . . . by the development of such new equipment as Hydracepter and Hyreco for more efficient and economical production of high pressure gas wells.

To further this program of improvement and new developments, which is a responsibility of leadership, Parkersburg has concentrated research, design, engineering, manufacturing and service of pressure equipment in its ten acre plant at Houston.

Ask your Parkersburg representative or write for bulletins and catalogs giving complete construction and performance data on Parkersburg Pressure Equipment.

No. 5105

• PARKERSBURG DIRECT FIRED AND INDIRECT HEATERS are available in sizes and types to fit every need for heating high pressure gas and for emulsion treating problems.

PARKERSBURG
PRESSURE EQUIPMENT

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • HYDRACEPTER • SCRUBBERS • TREATERS • HEATERS

Manufactured in Houston, Texas

sity, 28-2-University Lands, dry, TD 7,342 ft., elev. 2,660 ft., Spraberry 6,434 ft.

Runnels County: G. L. Howse 1 Machotaka, Sec. 154, WMRR Sur., dry, TD 4,995 ft., Swastika 2,811 ft., Palo Pinto 3,708 ft.

Vincent & Welch, Inc. 1 A. Stoecker, C. O. Harris Sur., dry, TD 4,702 ft., elev. 1,797 ft., Morris 3,720 ft., Serratt 2,550 ft., Ellenburger 4,595 ft.

Moutray-Moore Drilling Co. 1 D. L. Brevard, Blk. 11, N. Travis Sur. 533, dry, TD 4,160 ft., elev. 1,753 ft., Serratt 2,380 ft., Palo Pinto 3,295 ft., Gardner 3,935 ft.

Scurry County: V. A. Brill 1 Harrie Winston, 7-1-J. P. Smith Sur., dry, TD 7,908 ft., elev. 2,314 ft., Wolfcamp 4,214 ft., Mississippian 7,573 ft., Ellenburger 7,887 ft.

Terry County: Wilshire Oil Co. 1 J. L. Sims, 20-C32-PSL, dry, TD 10,514 ft., elev. 3,264 ft., Spraberry 7,630 ft., Dean 9,110 ft., reef 9,830 ft.

Wilshire Oil Co. 1 Southern Minerals, 47-T-D&W, dry, TD 10,588 ft., elev. 3,231 ft., Spraberry 7,538 ft., Dean 8,960 ft., Pennsylvanian 10,250 ft., Strawn 10,450 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Chaves County: Malco Refineries, Inc. 1 D. B. Anderson, 4-14s-28e, dry, TD 2,879 ft., elev. 3,570 ft., San Andres 1,612 ft., Glorietta 2,866 ft.

Malco Refineries 1 Pipkin-Federal, 13-13s-29e, dry, TD 3,242 ft., elev. 3,816 ft., San Andres 2,395 ft.

Lea County: H. S. Moss 1 State, 32-11s-33e, dry, TD 11,630 ft., elev. 4,302 ft., Abo 7,329 ft., Wolfcamp 8,467 ft., Pennsylvanian 8,635 ft., Mississippian 10,810 ft., Devonian 11,575 ft.

Lincoln County: Standard Oil Co. of Texas 1 J. F. Heard, 33-6s-9e, dry, TD 8,050 ft., elev. 5,822 ft., Abo 4,478 ft., Pennsylvanian 5,427 ft., pre-Cambrian 7,750 ft.

Louisiana-Arkansas

Stanolind Opens Two-State Pool

SHREVEPORT.—Successful completion of Stanolind Oil & Gas 1 Pine Woods Lumber Co. has extended Webster Parish's North Shongaloo production into Arkansas, making the area a two-state field. The well, located 551 ft. from the south and 660 ft. from the west lines of Section 11-20s-22w, Columbia County, flowed 39 bbl. of 40°-gravity oil on 3½-hour test of the Pettit lime. Perforations at 5,743-52 ft., 5,757-70 ft., 5,776-81 ft., and 5,794-5,815 ft. were acidized with 7,000 gal. Total depth is 5,860 ft., plugged back to 5,860 ft., with 5½-in. producing string set to 5,855 ft.

Another Columbia County test, Carter Oil Co. 1 McMetriss School, Section 29-19s-20w, is nearing 7,900 ft. It is scheduled to around 10,200 ft.

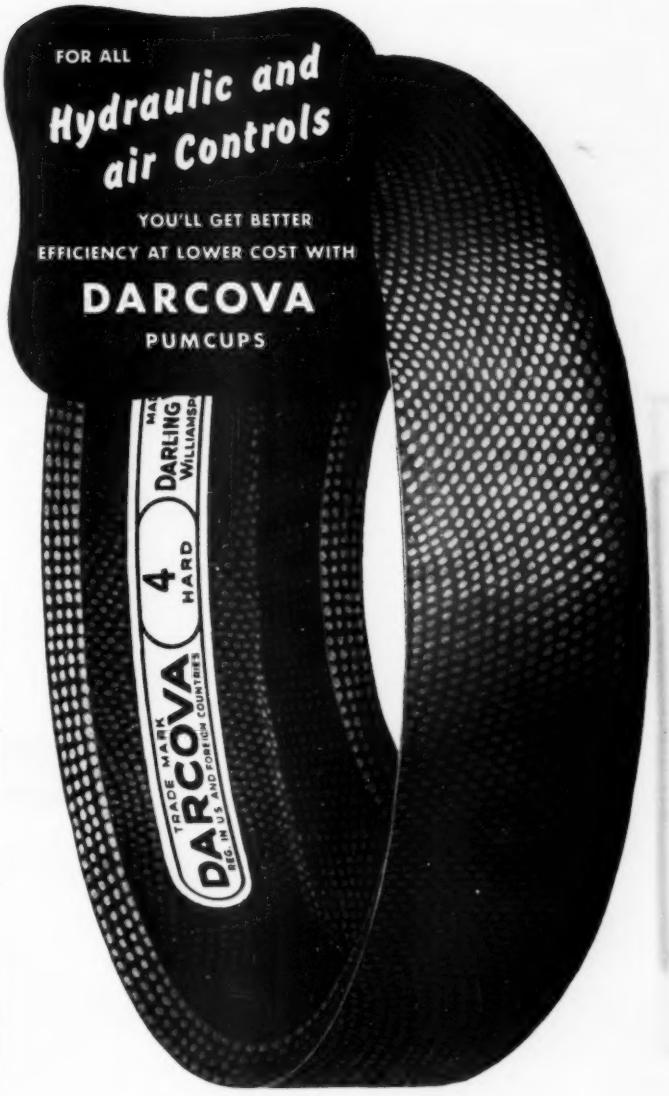
North Louisiana.—Caddo Parish's new Paluxy play has gained five new operations. All are in Section 15-19s-15w, where D. C. Carnes brought in the 1 Slattery for 80 bbl. of oil. The same operator also found Paluxy pay at his 1 Kennenwood Corp. in Section 5-19n-15w last week.

In Richland Parish, J. A. Harper Co. 1 Burkett has extended Big Creek field 1 mile to the north. Located in C SW SE NW 3-16n-7e, the test gaged 44 bbl. of oil per day through 9/64-in. choke from the Tuscaloosa at 2,638-48 ft. Total depth is 2,798 ft. Wilcox was picked at 1,283 ft., Midway at 2,098 ft., Tuscaloosa at 2,597 ft., and Lower Cretaceous at 2,698 ft.

NORTH LOUISIANA WILDCAT FAILURES

Claiborne Parish: Zach Brooks 1 Brinker, 660 ft. N and 1,983 ft. W SEc 14-23n-4w, dry, TD 9,601 ft.

James & Co. 1 King, 1,850 ft. S and 1,385



There's a free bulletin full of reasons and proof. Ask for it today!

DARCOVA

THE ORIGINAL COMPOSITION CUP

DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

PUMCUPS

ft. E NWc 29-22n-5w, dry, TD 11,045 ft.

Grant Parish: Crow Drilling et al 1 Colfax Lumber Co., C NE NW 36-8n-5w, dry, TD 4,150 ft.

LaSalle Parish: Placid Oil 134 Louisiana Central Lumber Co., C NW SW 34-11n-3e, dry, TD 3,197 ft.

Ouachita Parish: Petersen Drilling 1 Golson, C NE NE 25-17n-1e, dry, TD 6,732 ft.

Sabine Parish: Lynn et al 1 Louisiana Long Leaf Lumber Co., NW NE NE 21-8n-11w, dry, TD 3,000 ft.

ARKANSAS SUCCESSFUL WILDCAT

Union County: C. H. Murphy & Co., 1 Gottschall, 540 ft. N and 620 ft. W NE SE 3-18s-18w, flowed 91 bbl. oil from Cotton Valley at 6,769-77 ft., TD 7,894 ft., new pay in Wilks field.

ARKANSAS WILDCAT FAILURE

Ouachita County: C. G. Davis 1 Godsin, NE SE NW 36-15s-19w, dry, TD 3,816 ft.

Illinois-Ind.-Ky.

Oil Production Indicated In St. Phillips Wildcat

OPENING of another producing area in the St. Phillips vicinity on the Posey-Vanderburgh County line, 5 miles west of Evansville, Ind., is indicated by results of a drill-stem test at Skiles Oil Corp. 1 Orwie Seiler, NE NE SE 24-6s-12w. Testing Biehl sand, logged at 1,596-1,612 ft., the well flowed clean oil after tester was open 25 minutes. Gas was at the surface in 20 minutes. The well was drilled to the Cypress sand, producing zone of a well completed last November by the same operator, but found that pay dry. Total depth is 2,305 ft. with hole plugged back and casing cemented on the Biehl sand. The location is about a mile east of the village of St. Phillips on the Vanderburgh County side of the line. It is 1½ miles from other production in the area, except for the lone Cypress producer.

Six miles south of Olney in southern Richland County, Illinois, George & Wrather Drilling Co. has prospects of a good producer in its 1 Mina Beach, a wildcat test in the NW SE NW 10-2n-10e. A 60-minute drill-stem test in O'Hara lime at 3,238-53 ft. yielded 2,500 ft. of clean oil and 90 ft. of mud-cut oil. Bottom-hole pressure was 550 psi. There was no indication of water. Hole was drilled to 3,291 ft. and casing run through the pay at 3,290 ft. Location is 2 miles east of the Calhoun pool.

Walter Duncan 1 Wasson, SW NE SE 7-2s-10e, 5 miles southwest of Albion, Edwards County, Illinois, had 1,620 ft. of clean oil in the pipe following a 2-hour drill-stem test of Rosiclare lime at 3,389-93 ft. The well started flowing gas within 4 minutes after the tester was open. Total depth is 3,440 ft. with casing cemented on bottom. Location is 2½ miles from other production in the Ellery area.

Gilliam Drilling Co. has a prospective Cypress oil-discovery well at its 1 Fitzgerrell heirs, NW NW NE 29-5s-3e, southeast of production in the Whittington area, 3½ miles north of Benton, in Franklin County, Illinois. Saturation was logged at 2,529-43 ft. with bottom of the hole still in sand. A 60-minute drill-stem test of the zone yielded 260 ft. of clean oil and 90 ft. of oil-cut mud. Bottom-hole pressure was 920 pis. No water was evident. Casing has been run for completion.

A wildcat located a mile southwest of Spottsville, in Henderson County, western Kentucky, has given indication of production in two zones, the Aux Vases sandstone at 2,060-68 ft. and the lower O'Hara lime at 2,142-48 ft. It is R. E. Hupp and associates 1 Kernay, 21-Q-25. A 2-hour drill-stem test of the upper zone yielded 175 ft. of clean oil and 240 ft. of mud-cut oil with 120 ft. of water, and indicated a bottom-hole pressure of 640 psi. A similar test of the lower zone had gas at the top in 45 minutes and filled 965 ft. of clean oil and 60 ft. of mud-cut oil with bottom-hole pressure of 570 psi. Location is southeast of the Spottsville pool.

A new pay zone for the Zion pool, 7 miles east of Henderson, in the same county, is indicated at F. M. Ashby and Ashland Oil & Refining Co. 1 Gregory, SE NE NE 2-P-25. Prospective pay zone is the Waltersburg sand at a total depth of approximately 1,420 ft. A drill-stem test of the pay yielded 345 ft. of oil. Main production of the pool is from McClosky lime.

ILLINOIS SUCCESSFUL WILDCAT

Shelby County: Frank & Bassett 1 Clay, SE SW NW 2-11n-4e, IP 8 bbl., Aux Vases 1,821-29 ft., TD 1,829 ft.

ILLINOIS WILDCAT FAILURES

Clay County: National Associated Petroleum Co. 1 Barton, SW SE SE 12-3n-5e, dry, TD 3,007 ft.

C. N. Johnson 1 Hall, SE NW SE 8-4n-8e, dry, TD 3,007 ft.

Ashland Oil & Refining Co. and F. B. Drilling Co. 1 Kincaid-Green, SW SW SE 15-5n-6e, dry, TD 2,830 ft.

Edwards County: Calvert Drilling, Inc.-Walter Duncan 1 Horn, SW SW SE 9-1s-14w, dry, TD 3,091 ft.

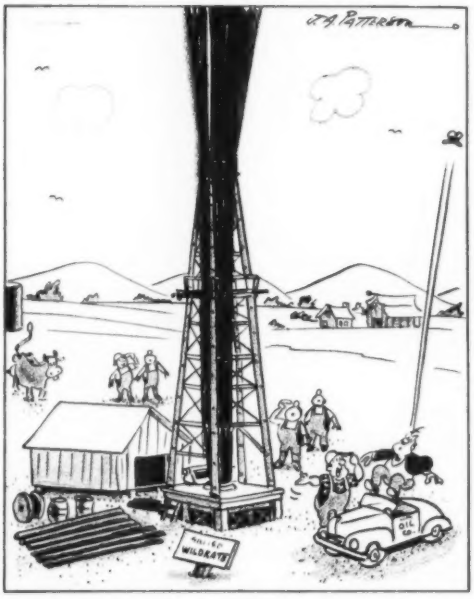
Wayne Misener-W. F. Lacy 1 Bower, SE SE NE 5-2s-10e, dry, TD 3,445 ft.

Effington County: Stanford Oil Co. and G. S. Schoonmaker 1 Schorman, S½ SE NW 26-6n-7e, dry, TD 3,032 ft.

Fayette County: Charles S. Nation 1 Metler, SE SW NW 1-8n-3e, dry, TD 2,106 ft.

Franklin County: Will I. Lewis 1 Davis, SW SE NE 23-7s-32, dry, TD 2,449 ft.

(Continued on page 198)



THE OIL AND GAS JOURNAL

"What a gusher! We don't even know how big it is—none of it's come down yet!"

The cheapest and fastest way to cut the toughest formation

Truco DIAMOND BITS
D&S CORE BARRELS

Drilling & Service

3031 Elm Street Dallas 1, Texas
OFFICE PHONE: Riverside-6811
NIGHT NUMBERS: TRemont-5539, Victor-3708, Dixon-4176

Other Offices - Services: Tyler, Texas — 2-2742; Odessa, Texas — 6774; Abilene, Texas — 2-2790; Victoria, Texas — 3264; Norman, Okla. — 4360; Shreveport, La. — 5-5474; Casper, Wyo. — 3739; Carmi, Ill. — 7801

Distributors: Diamond Drilling Co., 2759 E. Willow, Long Beach, Calif. Telephone: Long Beach 40-7940; Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861

Foreign: D. T. O'Connor, 500 Fifth Avenue, New York, N. Y.; Petroleum Industry Consultants, C. A., Caracas, Venez.; Denton-Spencer Co., Ltd., Calgary, Alberta, Canada.

North Central Texas

Wildcat Completing East of Sandusky Multi-Pay Field

WICHITA FALLS.—Snuggs & Neal 1 Little, Grayson County Pennsylvanian discovery east of the Sandusky area in Grayson County, prepared to run potential tests and complete. First 6 hours of the test produced 51 bbl. of oil through 10 64-in. choke with flowing tubing pressure of 380 psi.

In Jones County, Tal Vez Oil Co. et al 1 Cook, 4 miles south of Hauley, prepared to complete as a Flippen sand discovery. Before setting casing, a drill-stem test around 1,929 ft. recovered 460 ft. of oil and 90 ft. of heavily oil-cut mud in 1 hour and 45 minutes.

North of the Rotan field in Fisher County, Sinclair Oil & Gas Co. 1 Mrs. Belle Hunsaker prepared to plug back for completion in the Strawn sand after finding the Ellenburger dry. Top of the deep formation was 6,391 ft. and total depth was 6,705 ft.

In southwestern Fisher, 5 miles northeast of Cannon, Twin Oil Corp. 1 Terry was drilling below 6,611 ft. after recovering gas and 20 ft. of oil on a 3-hour drill-stem test in the Caddo from 6,570-79 ft. The wildcat also had oil and gas shows on a test in Canyon sand from 5,355-77 ft. It is being drilled on an Ellenburger contract.

Ward & McCullough 1 Rogers, lower Caddo prospect east of the Daly multiple-pay field, reported Caddo porosity from 3,954-4,045 ft., total depth, set casing on bottom and prepared to perforate and acidize. Tests had not been made at last report.

Kingwood Oil Co. had staked a diagonal northwest offset to the 1 Rogers, according to report.

In Jack County, southeast of Bryson, Star Oil Co. completed an oil discovery, offsetting its gas discovery. The oiler is 1 E. Ruth, Block 2, S. P. Survey, which flowed 114.5 bbl. of oil in 8 hours for a daily potential of 343 bbl. gaged through ½-in. choke. Production was from open hole at 4,474-90 ft.

Star's first well, the 1 Anna Kinder, same block, completed as a shut-in gas discovery in the conglomerate from 4,502-08 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Coleman County: Sloan Wells 1 Watson, Pleasant Young Sur., 12 mi. S Santa Anna, TD 1,246 ft., pay sand 1,211 ft., IP 2 bbl. 38°-gravity oil.

Cooke County: W. A. Loftin 1-A Cannon, S. S. Hail Sur., 9 mi. NE St. Jo, TD 1,346 ft., pay 1,307 ft., IP 25 bbl. oil.

R. H. Nix 1 W. F. Solomon, SPRR Sur., 5 mi. N Muenster, TD 1,695 ft., pay 1,549-52 ft., IP 6½ bbl. 36°-gravity oil.

Eastland County: Wasson Oil Co. 1 J. H. Caton, 24-4-H&TC, TD 3,251 ft., pay 3,216 ft., IP 2 bbl. 39°-gravity oil.

Jack County: Jack Grace Production Co. 1-A Kemper, J. C. O'Connor Sur., 13 mi. NE Jacksboro, TD 5,685 ft., conglomerate pay 5,368 ft., IP 1,880,000 cu. ft. gas a day, SIP 1,169 psi.

Knox County: T. D. Humphrey 1 M. Davis, Elijah Boren Sur., 8 mi. W Knox City, TD 6,020 ft., Strawn 5,116 ft., pay 5,120-34 ft., IP pumped 87 bbl. 37°-gravity oil a day.

Shackelford County: M. J. Mitchell 1 Arthur Adams, LAL Sur., 2 mi. NW Sedwick, TD 4,272 ft., Caddo 3,805 ft., perforated 3,966-71 ft., IP flowed 156 bbl. 45°-gravity oil a day, 16/64-in. choke, TP 375 psi., GOR 900:1.

Young County: Lebus Bros. 2 W. L. Hawkins, TE&L Sur., 2 mi. NW Loving, TD 3,500 ft., pay 3,483 ft., IP flowed 75 bbl. 4°-gravity oil in 3 hr., ½-in. choke, TD 200 psi.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Clay County: Continental Oil Co. 1 H. L. Scudder, Sec. 13, T&NO Sur., dry, TD 4,503 ft.

J. C. Jennings 1 M. L. Henderson, TE&L Sur., dry, TD 885 ft.

Frank Wood 3 Lone Star Producting Co., Blk. 28, Parker CSL, dry, TD 1,792 ft. in sand.

Coleman County: Republic Natural Gas Co. 1 D. M. Hankins, Sec. 3, ELRR Sur., dry, TD 4,035 ft., elev. 2,110 ft., Morris sand 3,478 ft., Gray 3,900 ft.

Comanche County: Sohio Petroleum Co. 1 E. H. Joiner, 4-2-H&TC, dry, TD 3,031 ft., Duffer lime 2,990 ft.

Cooke County: Seneca Oil Co. 2 N. A. Moss, Wm. Phelps Sur., dry, TD 1,325 ft.

Virgil Taylor 2 S. D. Meador, BBB&C Sur., dry, 1,576 ft.

Denton County: The Texas Co. 1 W. T. Evers, M. Forest Sur., dry, TD 5,305 ft.

Eastland County: McElroy Ranch Co. 1 Dan Wende, 52-3-H&TC, dry, TD 3,861 ft., Caddo 2,910 ft., Marble Falls 3,220 ft., Ellenburger 3,740 ft.

Jack County: Cloughley & Jennings 1 W. E. Hunt, J. A. Jackson Sur., dry, TD 555 ft.

(Continued on page 198)

HOWDY

PODNAH

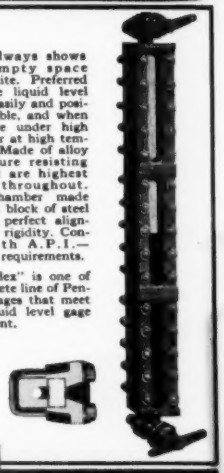
. . . jest call me Bill, and I'd sure thank you to call me if you're a-thinkin' about buying any tongs or hooks, or elevators. I peddle Web Wilson Tools and know from usin' 'em that they're the best for any fast movin' crew that can really dig hole if they have the tools to work with. So, even if all you're needin' right now is a box of those Tiger Tooth Tong Dies, I'd sure appreciate your calling me and lettin' us get acquainted. The phone is Wichita Falls 6-729, and the full name is Wm. J. Davis, but I'll get there faster if you jest call me "Bill" — kinda friendly like.

KAAR
RADIOPAK
THE MOBILE RADIOTELEPHONE
KAAR ENGINEERING CO.
PALO ALTO CALIFORNIA

PENBERTHY
"REFLEX"
DROP FORGED STEEL
LIQUID LEVEL GAGES

Liquid always shows black—empty space shows white. Preferred where the liquid level must be easily and positively visible, and when liquids are under high pressure or at high temperature. Made of alloy temperature resisting steel and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

The "Reflex" is one of the complete line of Penberthy Gages that meet every liquid level gage requirement.



PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

SIMPLIFY
THERMOCOUPLE
CONNECTIONS

Exploded view
TE Jack & Plug

These Quick Coupling Jacks and Plugs make connecting thermocouple circuits — *Simpler — Easier — Quicker* — especially when circuits must be broken frequently.

The Polarized Connectors are made of thermocouple material with either screw fastened or soldered connection. Bakelite cover halves are screw fastened; have finger-grip pull. The lead wire openings clamp duplex wire securely—relieving strain from connections.

For more information about these Connectors, Panels, Thermocouples, Lead Wires and Accessories, Write, now, for Catalog Section 23U.

FAIR LAWN Thermo Electric CO., INC. NEW JERSEY

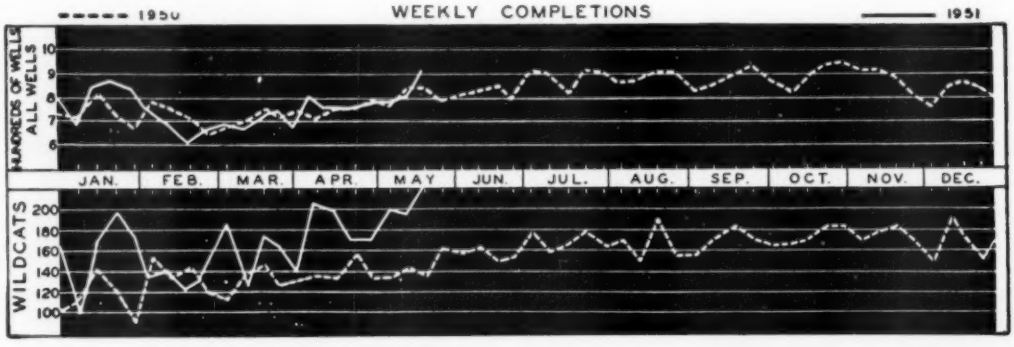
CURRENT STATISTICS

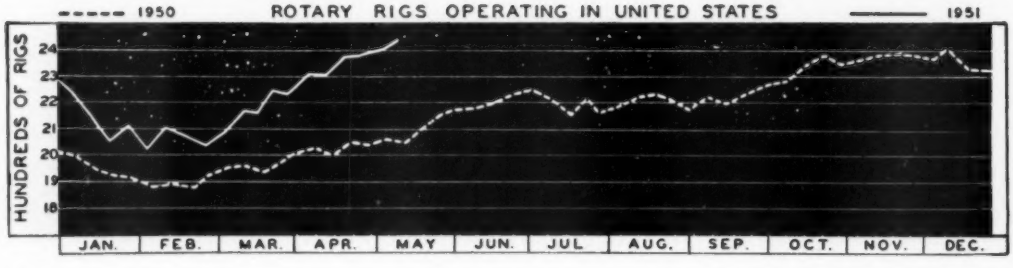
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED MAY 19, 1951

	Total of all wells					May 19		Wildcat completions and discoveries									
													Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	9	5	0	*4	13,068	157	199	0	0	0	0	0	0	0	0	0	0
Pennsylvania	7	3	1	†3	12,386	279	375	0	0	0	0	0	0	0	0	1	1
West Virginia	11	2	7	2	33,883	213	244	0	0	0	0	0	0	0	5	2	7
Ohio	22	10	5	†7	38,950	311	343	0	0	0	0	0	1	0	3	12	16
Indiana	27	6	0	‡21	49,881	373	457	1	0	0	12	13	10	0	1	98	109
Kentucky	40	19	0	‡21	62,714	349	325	0	0	0	7	7	4	0	1	55	60
Illinois	64	19	0	45	166,153	657	827	1	0	0	24	25	13	0	0	124	137
Michigan	9	4	1	4	25,913	249	297	1	0	0	3	4	8	0	4	102	114
Kansas	101	52	4	§45	337,141	1,570	1,332	7	0	0	23	30	75	0	6	303	384
Nebraska	5	2	0	3	16,930	107	30	0	0	0	2	2	3	0	1	49	53
Oklahoma	112	56	5	§51	391,006	2,098	1,977	2	0	0	13	15	73	1	11	275	360
Texas	358	211	23	124	1,787,233	6,218	6,033	23	3	7	76	109	271	26	46	1,195	1,538
North Central (Dist. 7-B & 9)	98	46	3	§49	327,044	1,881	1,871	7	0	1	31	39	133	0	6	509	648
West (Dist. 7-C & 8)	110	77	1	32	637,188	1,914	1,768	7	0	1	18	26	54	7	3	241	305
Panhandle (Dist. 10)	12	5	5	§2	37,749	265	386	0	0	0	0	0	0	0	0	11	11
Eastern (Dist. 5, 6, & 6-P)	36	27	1	8	168,046	443	426	1	1	0	6	8	3	4	0	83	90
Gulf Coast (Dist. 2 & 3)	55	30	8	§17	370,031	870	821	3	2	4	10	19	44	11	30	162	247
Southwest (Dist. 1 & 4)	47	26	5	16	247,175	845	761	5	0	1	11	17	37	4	7	189	237
Louisiana	40	17	2	21	257,566	744	911	1	0	0	6	7	19	0	4	99	122
Northern	22	9	2	11	106,203	367	469	0	0	0	6	6	5	0	3	54	62
Southern	18	8	0	10	151,363	377	442	1	0	0	0	1	14	0	1	45	60
Arkansas	7	5	0	2	25,317	140	141	1	0	0	1	2	4	0	1	28	33
Mississippi	14	1	5	8	120,353	106	130	0	0	0	5	5	5	3	0	38	46
Southeastern States	3	2	0	1	14,582	31	26	0	0	0	1	1	0	0	0	12	12
Montana	6	3	0	3	15,352	78	66	0	0	0	1	1	0	0	0	21	21
Wyoming	13	9	0	4	62,767	252	204	0	0	0	1	1	4	0	0	39	43
Colorado-Utah	4	1	0	3	26,128	94	23	0	0	0	3	3	2	0	2	46	50
New Mexico	13	4	5	4	55,179	252	235	0	0	0	4	4	7	0	5	31	43
California	54	39	1	14	236,455	779	625	0	0	0	13	13	17	0	1	158	176
Miscellaneous	0	0	0	0	0	17	6	0	0	0	0	0	0	0	9	7	16
Total United States	919	470	59	390	3,748,957	15,074	14,826	37	3	7	195	242	516	30	100	2,695	3,341
Total previous week	810	442	48	320	3,189,124			25	1	9	160	195	479	27	93	2,500	3,099
Total May 19, 1950	845	486	68	291	3,193,996			26	1	2	106	135	380	27	75	2,169	2,651

Service wells included: *4, †3, ‡2, §1.





DAILY AVERAGE PRODUCTION FOR WEEK

	May 19 crude oil	B. of M. May demand	May 12 crude oil
Alabama	2,800	2,400	2,700
Arkansas	77,750	84,000	77,750
California	965,100	970,000	965,800
Colorado	74,200	78,000	78,100
Eastern	60,980	64,000	61,000
Florida	1,575	1,600	1,650
Illinois	166,000	163,000	168,900
Indiana	28,600	30,000	28,800
Kansas	316,350	303,000	308,050
Kentucky	27,100	30,000	26,700
Louisiana	610,875	632,000	610,975
North Louisiana	114,850		114,950
South Louisiana	496,025		496,025
Michigan	40,900	42,000	40,900
Mississippi	100,050	106,000	98,650
Montana	24,600	24,000	24,800
Nebraska	7,200	10,000	7,700
New Mexico	142,800	140,000	142,800
Oklahoma	505,650	505,000	504,250
Texas	2,750,875	2,500,000	2,750,875
Dist. 1 (Southwest)	33,825		33,825
Dist. 2 (Southwest)	257,800		257,800
Dist. 4 (Southwest)	165,150		165,150
Dist. 3 (Gulf Coast)	482,875		482,875
Dist. 5 (Eastern)	52,450		52,450
Dist. 6 (Eastern)	113,500		113,500
East Texas field	272,700		272,700
Dist. 7-C (West)	96,600		96,600
Dist. 8 (West)	948,350		948,350
Dist. 7-B (W. Central)	85,875		85,875
Dist. 9 (N. Central)	153,150		153,150
Dist. 10 (Panhandle)	88,600		88,600
Utah	3,800	5,000	3,600
Wyoming	198,300	180,000	203,200
Total United States	*6,105,505	5,870,000	6,107,200
Change from prev. week, down	1,695		
Canada	154,485		116,020
Total U. S. production January 1-May 19			†827,585,220 bbl.
Same period last year (crude plus cond.)			692,928,170 bbl.

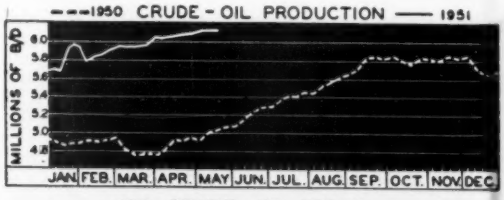
*Not including 109,580 bbl. condensate. †Including 14,937,055 bbl. condensate.

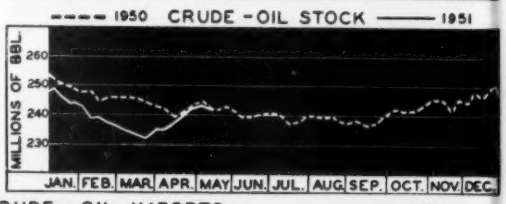
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

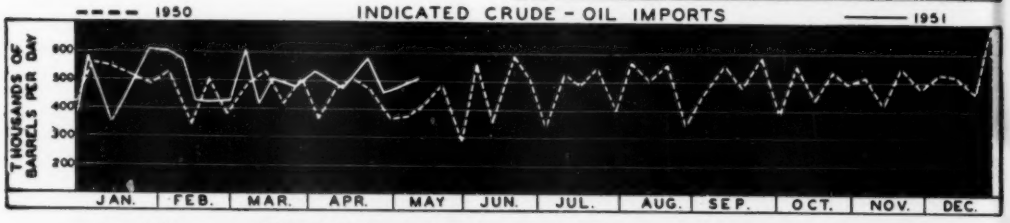
(Thousands of barrels)

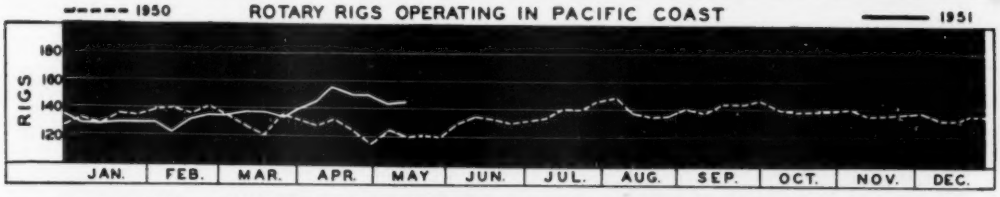
	May 12, 1951	May 5, 1951	May 13, 1950
Pennsylvania Grade	2,074	2,054	2,866
Other Appalachian	1,473	1,561	1,797
Illinois, Indiana, Michigan	10,684	10,473	8,857
Arkansas	2,538	2,720	2,908
Louisiana	14,179	13,936	15,151
North	2,791	2,692	3,346
Gulf	11,388	11,244	11,805
Mississippi	3,121	3,117	2,375
New Mexico	6,833	6,908	5,863
Oklahoma and Kansas	37,849	37,940	36,287
Texas	112,191	112,326	109,707
East Texas	13,795	14,321	14,797
West Texas	45,345	44,891	39,891
Texas Gulf	25,225	25,431	27,340
Other Texas	27,826	27,683	27,679
Rocky Mountain	14,133	14,209	13,239
California	30,175	30,306	36,520
Foreign	7,219	7,475	6,203
Total	242,469	243,025	241,773

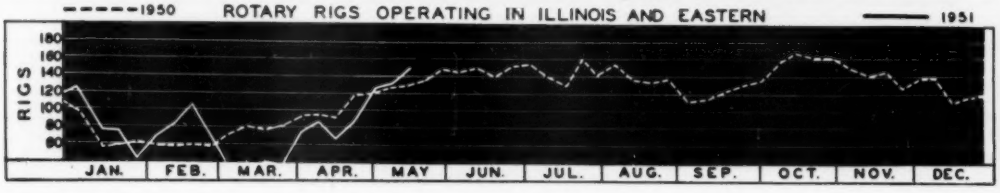
*Bureau of Mines.









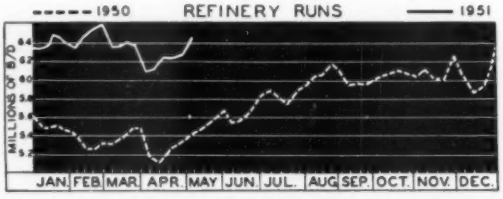


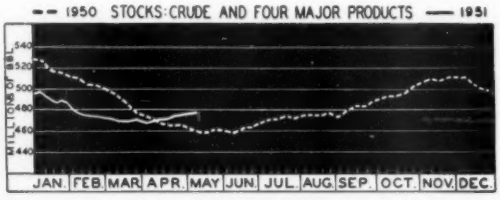
A.P.I. REFINERY REPORT, MAY 12

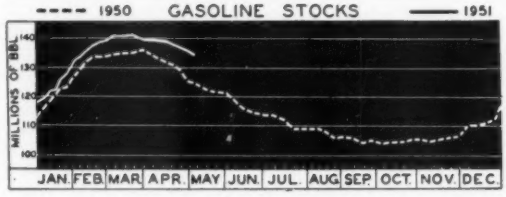
(Thousands of barrels)

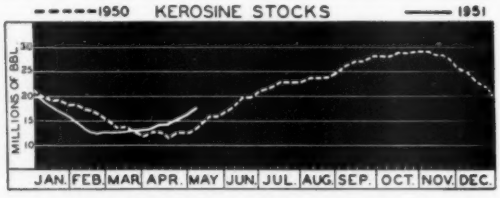
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, May 1950				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,045	358.4	41.4	200.6	223.3	27,599	7,213	14,077	8,975	928	377.5	36.2	187.7	206.2
Appalachian:														
District 1	103	45.0	5.2	14.7	10.9	2,956	340	532	237	97	41.0	6.1	12.3	11.2
District 2	71	38.3	4.7	6.1	15.0	1,298	101	228	166	73	33.9	4.6	8.1	13.9
Ind., Ill., Ky.	1,201	617.4	79.6	171.4	168.7	30,876	3,224	8,493	3,237	1,001	528.8	65.5	158.6	141.4
Okla., Kans., Mo.	516	259.4	16.4	109.4	68.8	15,730	754	5,471	1,077	495	268.0	21.5	96.3	57.7
Inland Texas	219	133.4	12.0	37.4	42.0	3,560	330	606	686	212	143.0	11.4	27.5	43.3
Texas Gulf Coast	1,590	694.9	110.7	305.6	260.1	20,150	2,929	5,780	3,934	1,155	551.8	92.6	240.8	201.4
La. Gulf Coast	491	262.6	64.9	108.3	50.6	7,175	1,677	2,224	1,320	473	231.2	55.1	93.0	57.1
N. La. and Ark.	82	32.0	8.7	17.2	8.7	2,744	433	778	68	72	25.3	7.0	13.8	12.0
Rocky Mountain:														
New Mexico	14	7.9		2.7	3.0	105	10	60	32	13	7.2	.2	2.4	3.4
Other Rocky Mtn.	203	106.1	6.0	37.3	40.0	5,547	196	1,206	635	163	76.3	4.0	31.9	30.2
California	925	439.2	5.4	137.2	388.3	16,782	533	7,601	16,190	853	363.4	11.6	125.0	285.2
May 12, 1951	6,460	2,994.6	355.0	1,147.9	1,279.4	134,522	17,740	47,056	36,557	5,535	2,647.4	315.8	997.4	1,063.0
May 5, 1951	6,283	2,903.1	396.1	1,207.6	1,279.9	135,764	16,802	45,247	36,095					
May 13, 1950	5,427	2,609.1	292.4	1,025.3	1,101.0	125,851	13,916	38,139	39,255					

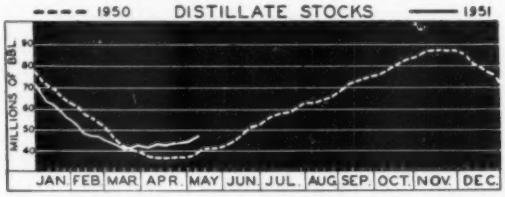
*At refineries including natural blended. †Finished and unfinished.

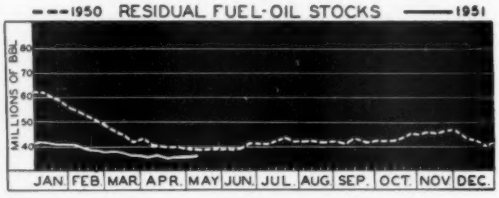


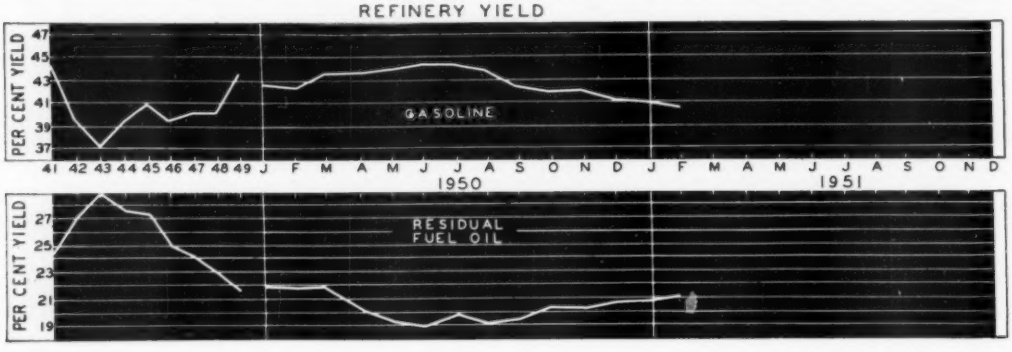











REFINERY YIELD
PER CENT YIELD
GASOLINE
41 42 43 44 45 46 47 48 49 J F M A M J J A S O N D J F M A M J J A S O N D
1950
1951
PER CENT YIELD
RESIDUAL FUEL OIL

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel	
East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

HIGH production figures for June, assured by the Texas allowable, will provide enough new oil for large additions to storage either as crude or refined products.

Crude and field-condensate production will average a little more than 6,200,000 bbl. daily. Crude imports have been averaging about 525,000 bbl. daily for a total new crude supply of 6,725,000 bbl. daily. Deducting about 125,000 bbl. daily for crude exports, transfers and losses, the amount available for refinery runs will be near 6,600,000 bbl. daily. If refinery runs average 6,400,000 bbl. daily for June, crude inventories will increase 6,000,000 bbl. during the month. Runs averaged 5,655,400 bbl. daily in June 1950. Runs of 6,400,000 bbl. daily next month will supply demand and provide for greater additions to product storage than in the same month last year.

Some Mid-Continent suppliers report best gasoline sales of the season in the week ended May 19, particularly from pipe-line terminals. The gasoline market is characterized by the absence of distress gasoline at refineries and the strength shown by cycle gasoline. Gasoline stocks in the Mid-Continent and North Central areas at the end of April were about 7,000,000 bbl. greater than last year, but the period of probable market reaction to lack of storage space has passed. The problem has shifted to planning for distillate and kerosine storage in the third quarter. In the past, distillate stocks have increased through October.

Recent reductions in coastwise tanker rates have resulted in major increases in chartering for early liftings. The increased movement from the Gulf Coast to East Coast terminals may bring an earlier buildup of distillate stocks in the high-demand areas and accelerated movement to reseller and consumer storage.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of May 21, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	9-9⅜	10	8½-9
No. 2 straw fuel oil	8⅛-8⅝	9	7½-8
No. 6 residual	$1.75-1.80	$2.25-2.30	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

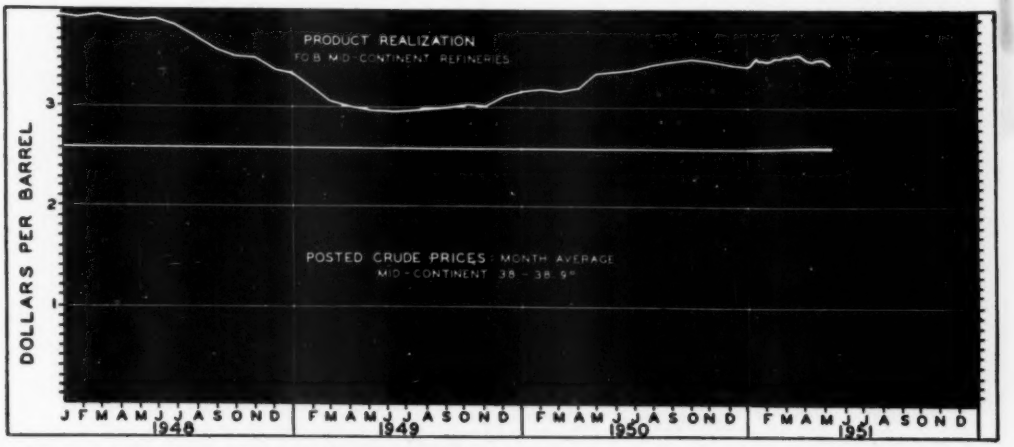
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	33.5
180 vis., 0 p.t. neutral	31.5

WAX

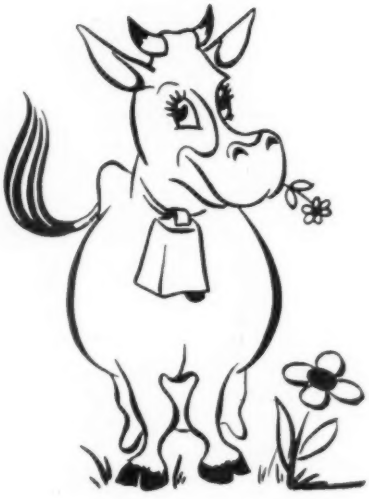
Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.46 for week ended May 12, $3.51 for previous week, and $3.37 for May 1950.

Do Your Firemen Look Like THIS?



Oh, we don't mean do they look like a cow, exactly. We mean, are they as contented as this bossy looks?

If they are, then they've likely got INFERNO equipment on their boilers.

And not only your firemen, but your whole crew, and you, yourself, will be far more contented if you install INFERNO Firing Controls, Feed Water Safety Units, Safety Valves, Water Gauges, and other equipment on your boilers.

Our Firing Control takes the uncertain human element out of firing, and will save you money by cutting out wasteful popping off. The Safety Unit also will save you money by giving you drier steam all the time.

So start right now installing INFERNO equipment on your boilers, and make your whole crew feel just as worry-free as that cow seems to be.

See your favorite supply store, or contact us direct. Write for free literature and price information.

INFERNO

The **INFERNO** CO.
P. O. Box 1138-B
SHREVEPORT, LA.

This
RED BOX holds
tong dies protected
TWO WAYS against wear!

ONE – BJ Tong Dies have a super-hard outer case for positive grip on the hardest joints.

TWO – BJ Tong Dies have a tough, ductile core to absorb shock and prevent breakage.

BJ TONG DIES ARE REVERSIBLE – they wear longer because you can spread the wear over the entire die!

BJ
TONG DIES... ENGINEERED FOR LONGER WEAR, EXTRA SAFETY

Byron Jackson Co.
MAIN OFFICE & PLANT: LOS ANGELES 54, CALIF.
Mid-Continent: Houston 1, Texas
Export: New York 17, New York

WORTHINGTON "QD" SHEAVES
and
WORTHINGTON-GOODYEAR V-BELTS

For Oil Field and Industrial Use

Complete Factory Stock in **HOUSTON, TEX.**

Additional Stocks Available thru Our Distributors

A. M. LOCKETT & COMPANY, LTD.
NEW ORLEANS HOUSTON DALLAS

EQUIPMENT MEN . . . in the News

Joyce Named to Sales Force of Vinson Supply

JACK JOYCE

Vinson Supply Co., Tulsa, has announced the appointment of Jack Joyce as sales representative in the Kansas City, Mo., area. Joyce, formerly buyer for Great Lakes Pipe Line Co. and Flour Corp., will maintain headquarters in Kansas City.

Bailie W. Vinson, president, stated the appointment was made better to serve the oil industry in the Southwest on the Vinson line of Crane and Nordstrom valves, Ladish fittings, Chase Brass condenser tubes, National pipe and steel tubes.

Ampco Appoints Begg District Manager

S. C. Lawson, general sales manager of Ampco Metal, Inc., Milwaukee, has announced the appointment of Louis C. Begg as district manager of the newly established Buffalo sales division.

Begg was transferred from the Ampco main office in Milwaukee where he has, for the past 3 years, been serving the company as special sales engineer for Ampco centrifugal pumps and for all Ampco alloys and products.

Hammond Iron Works Names Two Representatives

Hammond Iron Works, of Warren and Bristol, Pa., has licensed Lacy Manufacturing Co., Los Angeles, and Keyes Tank & Supply Co., Casper, Wyo., and Provo, Utah, to fabricate and erect all designs of Hammond conservation storage tanks. These designs include the Hammond Dialift, Diaflote, and Vaporlift tanks, as well as floating-roof and pressure tanks.

Lacy operates throughout the Pacific Coast and Hawaii, and Keyes Tank throughout the Rocky Mountain area.

Wheeler, Johns Elected To Executive Positions

Wilmot F. Wheeler has been elected chairman of the board of directors of American Chain & Cable Co., Inc., and will continue as its chief executive officer. He succeeds Walter B. Lashar, recently retired.

Cyrus N. Johns, who has been in the employ of the company since 1917, has been named president. Col. Harry D. Weed has been added to the board of directors.

Pryor Joins Engineering Staff of W-K-M Company

C. C. (Red) Pryor has joined W-K-M Co. as process applications engineer, and will devote his efforts to business with the gas and gasoline plants, refineries, and petrochemical phase of the oil industry. His headquarters will be in Houston.

Pryor formerly was associate editor of The Refiner. He holds a B.S. degree in natural-gas engineering from A. & I. College, Kingsville, Tex.

Worthington Breaks Ground For Turbine Pump Plant

Ground was broken at Succasunna, N. J., for a vertical turbine pump plant of Worthington Pump & Machinery Corp. recently by C. E. Wilson, vice president in charge of sales of vertical turbine pumps. The ceremony was presided over by E. J. Schwanhausser, executive vice president.

This one-story plant will be known as the Succasunna Works of Worthington Pump & Machinery Corp. It will manufacture vertical turbine

Natural Gasoline Supply Men's Association Officers

New officers and directors of the Natural Gasoline Supply Men's Association, who were elected at the thirtieth annual meeting of Natural Gasoline Association of America in Tulsa recently. Front row, left to right: W. F. Lowe, Tulsa, secretary; M. A. Ellsworth, Fluor Corp., Tulsa, second vice president; M. E. Duncan, Johns-Manville Sales Corp., Tulsa, first vice president; Dallas S. Deem, American Air Filter Co., Inc., Tulsa, president; L. L. Dresser, Dresser Engineering Co., Tulsa, retiring president; C. C. Clover, Westcott & Greis, Inc., Tulsa, treasurer. Back row, left to right: J. Dvoracek, Black, Sivalls & Bryson, Inc., Tulsa; Boyd F. Koepke, Aluminum Co. of America, Kansas City, Mo.; W. H. Edwards, Superior Manufacturing Co., Amarillo; R. P. Walker, Brown Instrument Co., Tulsa; M. D. Gilbert, Pittsburgh Equitable Meter Division, Rockwell Manufacturing Co., Tulsa; M. W. Conn, Perco Division, Phillips Petroleum Co., Bartlesville, Okla.; A. F. Canada, Jr., Pacific Pumps, Inc., Tulsa; and H. M. Anderson, Brown & Root, Inc., Houston. Not present when photograph was taken were: J. L. Tullis, J. B. Beaird Co., Inc., Shreveport; Roy Blackbird, Crane Packing Co., Houston; V. V. Jacomini, Hudson Engineering Co., Houston; M. H. Kotzebue, Gasoline Plant Construction Corp., Houston; Warner Lewis, Warner Lewis Co., Tulsa; Ray E. Miller, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; Jack A. Davis, Continental Supply Co., Dallas; and E. C. Wise, General Electric Co., Dallas.

pumps to serve customers east of the Mississippi River, as well as customers abroad.

The unit-type construction will contain several bridge-type traveling cranes and will be used primarily for warehousing and assembly work.

Key Company Enlarges Executive Staff

Enlargement of the executive staff of Key Co., East St. Louis, Ill., producer of oil-refinery and power-plant equipment, has been announced by B. J. Gross, president.

Two new officers elected are L. W. Matthey, vice president and assistant general manager, and F. B. Riggan, vice president in charge of research and development. Prior to his promotion, Matthey was assistant to the president. Riggan previously had served as manager of manufacturing, and for several years was chief metallurgist.

Other officers reelected were R. L. Dutton, chairman of the board; B. J. Gross, president; G. A. Miller and I. F. Krabbe, vice presidents; P. W. Smith, treasurer, and G. J. Rothweiler, secretary.

Dodd to Head Two Plants For Foster Wheeler Corp.

Gerald D. Dodd, assistant to the president of Foster Wheeler Corp., will assume charge of manufacturing at its Carteret, N. J., and Dansville, N. Y., plants, succeeding William Lonsdale, vice president in charge of manufacturing, who has retired from active duty.

Dodd became affiliated with Foster Wheeler in 1929 at which time he was in charge of the heater and evaporator group. In August 1950 he became assistant to the president.

Dom Joins A. G. McKee As Chief Engineer

John M. Dom has resigned from the engineering division of Jones & Laughlin Supply Co. to become affiliated with Arthur G. McKee, Cleveland, as process engineer.

Dom was formerly chief chemist for Ashland Oil & Refining Co. from 1933-1937; chief chemist and assistant superintendent from 1937-1938 for Talco Asphalt Co.; process engineer for Petroleum Rectifying Co., California, from 1938-1942; project engineer for Frick-Reid Supply Co. from 1942-1945; and chief process engineer for J & L from 1945 until present affiliation.

Dresser Industries Hold First Board Meeting in Dallas

President H. N. Mallon, of Dresser Industries, Inc., and four directors in attendance at Dresser's first board meeting since moving its general headquarters to Dallas. They are: Prescott S. Bush, partner, Brown Brothers Harriman & Co.; Henry P. Isham, president of The Clearing Industrial District, Inc., Chicago; William A. McAfee, leading corporation attorney and industrialist of Cleveland; H. N. Mallon, president of Dresser Industries, Inc., and Norman Chandler, owner and publisher of the Los Angeles Times.

H. P. Boncher Named New Dresser Vice President

H. P. BONCHER

Announcement has been made by H. N. Mallon, president of Dresser Industries, Inc., of the election of H. P. Boncher, general manager, Dresser manufacturing division, Bradford, Pa., as vice president of Dresser Industries. Boncher joined Dresser shortly after graduation from University of Cincinnati. He was appointed assistant sales manager in 1930, promoted to sale manager in 1938, and made general manager in 1942.

Other officers of Dresser Industries elected were: H. N. Mallon, president; J. B. O'Connor, executive vice president; Arthur R. Weiss, vice president; and M. H. Nelson, assistant secretary and assistant treasurer.

Augsberger Appointed to Sales Staff by Kobe

John Augsberger has joined the perforated sales department of Kobe, Inc., according to a recent announcement made by J. J. Siegel, Kobe's manager of perforated sales.

In addition to his experience in various oil fields in North America, Augsberger was in charge of producing oil wells in Trinidad, B.W.I., and brought in the first producing well in Cuba. In 1922 he joined Lang-Wall Corp. and was in charge of its Signal Hill development until 1927 when he joined Arthur N. MacCrate as general manager, which position he held for 22 years.

Burnette Made Service Manager by Rockwell

R. V. BURNETTE

A. J. Kerr, vice president of sales for Rockwell Manufacturing Co., has announced the appointment of R. V. Burnette as service manager for the meter and valve division. His duties will also consist of establishing repair procedures in factories and district warehouses.

Burnette was affiliated with Standard Steel Car Co., Sharon, Pa., before joining Pittsburgh Equitable Meter Co. in 1926. During the ensuing 25 years he held positions of junior engineer, gas sales engineer in the Chicago district, and sales supervisor for the Pittsburgh-DuBois Division of gas products for Chicago, Columbus, and Pittsburgh sales districts.

Semi-Annual Technical Meeting Held by Filtrol Corp.

Filtrol Corp. held a semiannual technical meeting the latter part of April at Rancho Santa Fe (Los Angeles area) which brought together research, manufacturing, and sales representatives to discuss various problems on catalysts and adsorbents.

Personnel from Jackson, Miss., and Salt Lake City plants, and the Vernon plant were in attendance.

(Continued on page 198)

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

CLASSIFIED ADVERTISING

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

FOR SALE: One drilling rig complete including 127′ Lee C. Moore mast and 7,200′ of 4½" drill pipe. Rig capacity 7,500 ft. Now operating in Oklahoma. All equipment A-1 mechanical condition. For further details and inspection write Box E-132, The Oil and Gas Journal, Tulsa, Oklahoma.

IMMEDIATE delivery complete workover Jack Knife Rig. Details and price on application. P. O. Box 3246, Corpus Christi, Tex.

FOR SALE: 4000 ft. 2⅜" Range 1 drill stem with Hughes Acme tool joints. Charles Clemens, Princeton, Indiana.

HOT BUY—8" COLLARS
28 lb. line pipe couplings at Dallas. Oilton Pipe & Supply Co., Oilton, Okla.

MODEL H. L. Cardwell Spudder, complete. New Engine, New light plant. Two complete sets of tools, 5½" & 7". Tool rack & dog house. J. H. Jarrell, 713 S. Hickory, Centralia, Illinois.

FOR SALE: Ideal slush pump, Model C-150. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: Failing 1500, Buda engine, 38 foot mast, mounted on 6x6 truck, complete with drill rod and accessories, operating and in good condition. H. W. Peerson Drilling Co., 1114 Seventh Avenue South, Birmingham, Alabama.

FOR SALE

New at East Chicago, Indiana, 3 BS&B Catalytic Converters Complete, 4′ ID x 29′ Ser. #2856T1, 2 and 3, Shells ½" thick ASTM—A 70 Flg. quality steel, Tube Sheets 10¼" Thick same steel, cover plates 7⅜" thick ASTM—A 212 Fire Box quality, 48—5" OD x 26′ x ⅜" Seamless Tubes A-106-39 Grade "B", Shell Design Pressure 60# PSIG, Test 90#. Tubes and Heads 1100# PSIG, Test 1650#. Full data and price on request.

CITIES SERVICE OIL
Patridge, Bartlesville, Oklahoma

HOT OIL PUMPS

5—National Transit 5¼" x 24" Reciprocating, Duplex Plunger Double Acting; Crank and Flywheel, Direct connected to—General Electric Induction Motor; 250 H.P. @ 585 RPM; 3 ph., 60 cy., 2200 V, 63 amps., with Controller and Switchboard.
1—National Transit 18" x 6" x 24" Steam Reciprocating; Crank and Flywheel, Twin Meyer Valves, Packed plunger at liquid end.
1—Wilson-Snyder 16" x 5½" x 18"
3—Wilson-Snyder 18" x 9" x 18"
1—Union 18" x 8" x 24"
3—National Transit, 7½" x 5" x 10" All Steam Reciprocating, Duplex Piston Type

Call or Write for Complete Catalog

DALLAS REFINERY PROJECT
Federal 6566 Box 5624 Dallas, Texas
Liquidating The Texas Co. former West Dallas Refinery

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Two 6-cylinder Hydraulic casing pulling machines. One 7", 5", 3", seven foot jacks; one 5", 3", four foot jacks. Box E-128, The Oil and Gas Journal, Tulsa, Oklahoma.

ONE Landis Model-27 crank shaft grinder, size 20" swing by 72" centers with 30" diameter grinding wheel and individual motor drive. Like new condition—Bargain! Acme Screw Products Co., 1537 East 7th St., Tulsa, Oklahoma. Phone 2-5477.

CASING PULLING CONTRACTORS with Hydraulic Equipment: Experienced operators—Pull any size pipe, anywhere. Also will buy wells for salvage. GENERAL CASING PULLING CO., P.O. Box 4387, Oklahoma City. Phone 6-1335.

FOR SALE—Mayhew Model 2000′—1 Year old. A-1 Condition—mounted on International Tandem—5 x 8 G-D Pump—2000′ 2⅞" drill pipe, drill collars, core barrel. International winch truck, trailer mounted dog house, water tank, light plant, water pump, misc. tools; Rig now working in Oklahoma. Contracts available. Box E-113, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT FOR SALE

2—Identical Electric Machinery Manufacturing Company Generators, 60 KVA, 40 KW, 480V, 60 AMP, 1200 RPM, 3 Phase, 60 Cycle, each powered by a Buda Model L525 natural gas or gasoline engine and each cooled by a Young Happy Model 36 Full Flow Engine Jacket Water Cooler. Horsting Oil Company, P. O. 388, Driscoll, Texas.

FOR SALE: At Barnsdall, Oklahoma, 1—Used 10" x 4½" x 10" Chicago Pneumatic belt driven compressor 500# operating pressure, 275,000 CFD, Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: 20,000′ 4" o.d. 6 lb., seamless line pipe. Random lengths 30′ to 35′. This is number one used pipe. Clean, straight, beveled, ready to lay. Price 75c our yard. M. J. Regan, Coffeyville, Kans.

Casing—5½ and 7" No. 1 grade lapweld and seamless

Tubing—2, 2½ and 3" regular and upset

Water Well Casing—5⅝" and 6¼" attractively priced.

D. A. MORITZ CO.
91h & B&O, Braddock, Pa.

PRICED RIGHT
OILWELL CASING AND TUBING

Texas area	St. Louis area			Description
15,000′		2⅜"OD	3.65#	Used Lapweld T&C Line Pipe, 11½ V-Thd.
15,000′	5,100′	2⅜"OD	4#	Used Lapweld T&C Tubing, Range 1, 11½ V-Thread.
8,000′	10,000′	2⅜"OD	4.6#	Once Run J-55, Range 2, T&C Tubing, 10 Round Thread.
6,000′		2⅜"OD	4.6#	Used Smls. Range 2 T&C Tubing, 11½ V-Thd.
	6,200′	2⅜"OD	4.6#	Used Lapweld Range 1 T&C Tubing, 11½ V-Thd.
8,000′		2⅜"OD	4.7#	Used Smls. EUE Range 2, 10 V-Thread.
4,000′		2⅜"OD	4.7#	Used Smls. EUE Range 1, 8 Rd. Thread.
7,000′	1,360′	5½"OD	14#	Used Lapweld Range 1 T&C Casing, 11½ V-Thd.
4,000′	760′	5½"OD	15#	Used Lapweld Range 1 T&C Casing, 11½ V-Thd.
3,000′		5½"OD	17#	Used Lapweld Range 1 T&C Casing, 11½ V-Thd.
1,022′		6"OD	18#	Once Run Seamless Range 2 T&C Casing, 8 Rd. Thread.
1,899′		6"OD	20#	Once Run Seamless Range 1 & 2 T&C Casing, 8 Rd. Thread.
10,000′	10,000′	7"OD	17#	Used Lapweld Range 1 T&C Casing, 10 V-Thd.
5,000′		7"OD	20#	Used Lapweld Range 1 T&C Casing, 10 V-Thd.
5,000′		7"OD	24#	Used Seamless Range 1 T&C Casing, 10 V-Thd.

SUBJECT TO PRIOR SALE

OTHER SIZES NEW AND USED CASING, TUBING, LINE PIPE AND SEAMLESS TUBING . . . MANY SIZES SUITABLE FOR GAS, OIL, WATER FLOW LINES. FOR FULL DETAILS, WIRE OR PHONE AT ONCE

A. J. STRUBEL, Broker

SIDney 1791 (Day Phone) HUDson 8152 (Night Phone) 4946 Murdoch, St. Louis, Mo.

EQUIPMENT FOR SALE

EVERYTHING in Cable Drilling Tools, Rigs—Belts—Tanks—Engines. 25 Complete strings heavy tools. Tri State Tool & Supply Co., Box 827, Phone 7-5121, Parkersburg, W. Va.

FOR SALE: Approximately 760′ of 2⅜" drill pipe, with API tool joints. Harry Moore, Phone 56 or 1138, Claremore, Oklahoma.

WAR SURPLUS EQUIPMENT
2½ to 25 Kw Light Plants, Byron Jackson Pump Units, Gaso Pump Units, Hale Fire Pump Units, Stewart-Warner Heater Units, Benson Portable Power Hoist, Victaulic Pipe Couplings & Fittings, Mobilift Forklift Trucks, New Wheatley 4" & 6" Gate Valves 500 WP. Write for listing—H. A. McCarthy, 310 Thompson Bldg., Tulsa, Oklahoma. 5-3296.

2500 12¾" O.D. Line pipe couplings, also 100 16" O.D. New and Used. Reasonable. A. A. Gilbert Pipe & Supply Co., P.O. Box 986, Shreveport, La.

FOR SALE: National 50 rotary drilling rig, NKU Waukesha engines, new Lee C. Moore 130′ 515,000# capacity mast with substructure, new 7¼ x 14 Gardner Denver pump, good drill pipe, everything complete and in first-class condition. H. Waggoner Drilling Co., Box 4657, Oklahoma City, Okla. Phone 64-1413.

WELL EQUIPMENT: New and used spudders, rotaries, core drills—all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools. Everything for Well Service. Pressey & Son, Pueblo, Colorado.

NEW DRILL PIPE: 11,000 ft. string, new grade D 16.60 lb., range 3. Internal flush, external upset. Plain end for flash weld tool joints or can be shopped for casing use. Box E-129, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE LINE EQUIPMENT FOR SALE

1—Buckeye Wheel Trencher, Model #12. Just rebuilt. Buda Gasoline Motor.
1—Buckeye Wheel Trencher, Model #12. AI condition. Caterpillar Diesel Motor.
1—TD14 Angledozer. Rebuilt. Good Condition. With Tail Winch.
Various 200 and 300 Amp Gasoline driven welding machines.

Harford Brothers Construction Co.
Post Office Box 191, Emporium, Pa.

EQUIPMENT WANTED

WANTED: PORTABLE ROTARY
Complete, fair condition, 4,000′ Cap. Box 198, Gorham, Kansas.

WANTED: Good used well drilling equipment. Spudders, rotaries, large or small. Tools and general equipment. We distribute throughout the West with hundreds of customers. Pressey & Son, Pueblo, Colorado.

OCS GREYHOUND Chain Driven Sand Reel, Heavy Cable Tool Rigs; Side Door Elevators; Control Heads, Spudders, Skid Type Pulling Units. McGinnis, Tri State Gas, Box 627, Parkersburg, W. Va.

WANTED TO BUY: Good used 2⅞ full hole 20′ drill pipe. State location and price. Frank Herring, 303 Orpheum Bldg., Wichita, Kansas.

WANTED: Wanted to buy complete drilling rig capable of 6,500′ depth. Sasko-Wainright Oil & Gas, Ltd., 305 Wallace Building, 9921-101A Avenue, Edmonton, Alberta, Canada.

EQUIPMENT FOR SALE

SULLIVAN 200, mounted on Mack tandem truck, 45 foot mast, 5 X 8 Gardner-Denver pump, Rig powered by two Industrial 12 Chrysler engines 140 hp. each, vee belt drives, automatic chuck, hydraulic pull down, 26 foot Kelly, swivel, hoses, breakout tongs, and many other tools including about 1000 feet of drill pipe. Rig had $8000.00 in new parts put in it recently. Excellent condition. $15,000.00. Now operating in eastern Nebraska. Omaha Drilling Co., 624 Service Life Bldg., Omaha, Nebraska.

FOR SALE: At Madison, Kansas, 1—Model FS-35 Cardwell Skid Type Oil Field Servicing Unit. $750.00. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: Superior-General Electric natural gas engine-generating unit. 1-683 hp., 480 kw., 327 r.p.m., 400 v., 3-phase, 60-cycle. 1—510 hp., 350 kw., 400 r.p.m., 480 v., 3-phase, 60-cycle. Complete with exciters and generating panels. All in A-1 condition. Will consider selling engine separately. Max E. Landry, Inc., Tulsa, Oklahoma Phone 5-5639.

BUCYRUS 24 W, Waukesha engine, mounted on International 2½ ton truck. Drilling and fishing tools, cables. S. W. Pressey & Son, Pueblo, Colorado.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-38 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

26" O.D. STEEL PIPE

Approximately 6,000 ft. 26" Steel Pipe .312 wall thickness, weight 85.73 lbs. per ft. Electric welded, used, lengths 40 to 50 ft., ends beveled. Recently recovered from a high pressure natural gas line, operated at 500# pressure. This is good pipe located in our Kansas City yard. Available immediate inspection and shipment.

CAST IRON GATE VALVES

We have just completed facilities and machine tools for reconditioning valves. Appr. 400 tons of all sizes from 3" to 24" Cast Iron Gate and Globe Valves, entirely rebuilt, tested and guaranteed. Now offered at great savings. Send us your inquiries and stock up while large range of sizes are still in stock.

CAST IRON PIPE

2,000′—24"—B&S 150 Class
1,500′—18"—B&S 200 Class
2,160′—14"—B&S 200 Class
454′—12"—B&S 200 Class
288′—10"—B&S Class, 200
625′— 8"—P.E. Class, 150
123′— 8"—FLG Class, 150
351′— 6"—P.E. Class, 150

Also large inventory of Cast Iron Fittings; Bell & Spigot type and Gate Valves. All Cast Iron Pipe recently removed from a water line and in good usable condition, located our Kansas City yards.

WRITE—WIRE—PHONE

BROWN-STRAUSS CORP.

1546 Guinotte. Phone HA. 1000 **Kansas City 10, Mo.**

HELP WANTED

WANTED: Sales representative by old established pumping equipment manufacturer, liberal commission basis. Desirable territories open, all replies confidential. Box D-986, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

LAND MAN: Experienced land man for major company operating in Mid-Continent areas. Ages 30 to 45. Excellent possibilities. Replies confidential. Box D-990, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER, Assistant to the Production Manager in Rocky Mountain area. Man with proven production record with 5 to 10 years experience. Salary commensurate with ability and experience. Submit complete details and salary desired. Box E-109, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED rotary driller, also cable tool driller on large water well work. Box E-116, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced finance man who has contacts with Capital oil investors. Have most unusual opportunity for good investment. Give full details in reply. Anglo-American Co-Operative Oil Co., 69 West Washington St., Chicago, Ill.

WANTED: PRODUCTION MAN capable of making drilling contracts, buying materials, completing wells, etc.—must be good. Box E-127, The Oil and Gas Journal, Tulsa, Okla.

WANTED immediately: Warehouse and Purchasing Assistant. Prefer man with Engineering training or experience in Material handling and purchasing. Location Western Canada. Forward snapshots and complete information first letter. Box E-131, The Oil and Gas Journal, Tulsa, Oklahoma.

SAFETY SUPERVISOR

Required by Oil Company in South America.

Must be a graduate engineer, preferably with a degree in Mechanical Engineering and have had 5 years petroleum, drilling and production safety supervision. Will be required to organize and direct all phases of Safety Supervision throughout a large Refinery and attendant installations. Spanish indispensable. Give complete details of education and past experience to—

Box E-133, The Oil and Gas Journal, Tulsa, Oklahoma

PROCESS ENGINEER

To be located in Tulsa, Oklahoma, to work on projects in Petroleum and Pero-Chemical field. Operating experience desirable but not required.

Letter should include details of education, experience, family and military status, and salary expected. Personal interview can be arranged.

Chemical Plants Division

BLAW-KNOX CONSTRUCTION COMPANY

Box 1266 **Tulsa, Oklahoma**

HELP WANTED

HELP WANTED

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL

for

LARGE INTERNATIONAL OIL CO.

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-143, The Oil and Gas Journal, Tulsa, Oklahoma

WANTED: Capable crude oil scout or assistant crude buyer for aggressive independent refiner. Good salary to right man who probably is in mid 30's. Able pipe line or land department scout may make grade. Petco Corporation, 425 Wilson Bldg., Dallas, Texas.

GEOPHYSICIST

Expanding, integrated, independent oil company has opening for Geophysicist. College graduate with six to eight years geophysical work. Five years as Party Chief or Supervisor. Interesting employe benefits, good salary for qualified applicant. Our employes know of this opening. All Applications held in strictest confidence. Write Personnel Division, P. O. Box 1051, Tulsa, Oklahoma.

WANTED: Experienced oil field mechanic for gas engines, West Texas and New Mexico area. In field and shop. If interested, reply by letter to: Box E-123, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Young man with Crude Oil Purchasing experience — Gulf Coast Area preferred. Please give education, experience and salary expected in first letter. Box D-987, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: Aggressive, well integrated strong independent company with comprehensive geophysical program desires geophysicist. 35 to 40 years old. Must have considerable experience, preferably with company background. Experience in Rocky Mountains, West Texas and Southwest Texas desirable. Duties consist mainly of supervision of contract crews and reanalysis of seismic data. Located in company headquarters but considerable traveling involved. Salary dependent on experience and ability. Write giving full details. Replies held strictly confidential. Box E-120, The Oil and Gas Journal, Tulsa, Oklahoma.

CIVIL ENGINEER and surveyor, graduate, several years experience oil industry. Will train. Box E-134, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOGRAPH OPERATOR

Major Company has openings for graduate electrical engineers experienced or interested in training as Seismograph Operator. Must be single and willing to accept future foreign assignment for two-year period in Venezuela, Colombia, Peru or Indonesia. Give full details of personal qualifications in first letter to Box E-140, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

Oil refinery inspector for East and Central States area. Age 30-40. Experience preferred, but will train applicant having knowledge of refinery maintenance and repair. Must have car, traveling required. Our employees know of this opening. Please give complete details in letter to **Box E-141, The Oil and Gas Journal, Tulsa, Oklahoma.**

MECHANICAL PETROLEUM ENGINEER

With 5 or more years' experience for Design of Oil Field Equipment.

UNION TANK & SUPPLY CO.

P.O. Box 2092 **Houston 1, Texas**

SITUATIONS WANTED

REFINERY superintendent desires change. Consider job other than supt. Must give present employer adequate notice. Box E-124, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Petroleum and Natural Gas Engineer: 25 years old, single, non-reservist, interested in foreign employment, speak Arabic. Box E-119, The Oil and Gas Journal, Tulsa, Oklahoma.

TOOL PUSHER
20 Years Experience

Desires permanent employment with independent oil company. Box E-117, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

MATERIAL CONTROL. Inventory, Purchasing and Liaison Executive Assistant. General knowledge of Production and Drilling. Available soon. Box E-126, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, now operating as an independent, would like to become associated with operator or group in need of an experienced man, on a salary-interest basis. Have been associated with the oil industry better than fifteen years in geological and geophysical exploration, development, leasing, and other phases of operation. Capable of directing operations and passing on submittals made. Salary of minor importance. Interview can be arranged. Box E-105, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: (B.S.), eight years' experience, desires responsible position Gulf Coast area.—Box E-130, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, B.S., Veteran, June Graduate, desires position with Petroleum Company in U. S. or South America. Box E, The Oil and Gas Journal, New York City, N. Y.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. **Makin Drilling Company, Box No 131. Ph. No. 131, Hobbs, New Mexico.**

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.

SUPERINTENDENT AVAILABLE
25 YEARS' EXPERIENCE
GRADUATE PETROLEUM ENGINEER
Box E-103
The Oil and Gas Journal, Tulsa, Oklahoma

SUPERINTENDENT with years lumber experience wants connection in Spanish Speaking country. Have supervised dismantling, rebuilding and operating of logging, railroad and manufacturing operation employing 500 men. No military status. Box E-142, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

EXECUTIVE SECRETARY

offers exceptional training and experience to top-flight oil executive in Oklahoma or Texas. Have served as official court reporter and administrative assistant with supervisory experience. Able to handle correspondence and meet all kinds of people. Man, 35, single, two years college. For personal interview write Box 141, Bristow, Oklahoma.

GEOLOGIST desires return to foreign employment. Total of 22 years foreign experience. Last 13 years in Latin America with major oil company; previous 9 in Near East. Box E-139, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

KANSAS OIL DEALS WANTED: Reputable independent operator and producer solicits your drilling deals. Box D-974, The Oil and Gas Journal, Tulsa, Oklahoma.

SHALLOW LEASE in Eastern Kansas with one well and flowing part time with #5½ Keystone drilling machine complete. Very reasonable. Box 198, Gorham, Kansas.

FOR SALE: Have several nice leases in Shelby County, Texas. In Humble and other major Company blocks, lots of activity. Brokers invited. Write for information. C. A. Parker, Center, Texas.

160-ACRE oil lease, Eastern Osage County, Oklahoma, has well that made 75 to 100 barrels a day, natural, 1,500 feet deep, Mississippi lime, 30 feet of pay, no water. Drilled by a gas company that did not own the oil lease. Well cemented and cased off and produced for gas. No oil has been produced in the area from this depth. Good structure. A well drilled here should open a new pool. One-half interest for drilling and furnishing all equipment complete for the first well. Lease also has water flood possibilities from shallow wells. P. O. Box 2611, Tulsa, Oklahoma.

OIL LEASE—185 acres near DeRidder, Louisiana Beauregard Parish encircled by Major Companies recent block. Interesting prospect to right party. A. Dickinson, Lake Arthur, Louisiana. Gen. Delivery.

WILL DEAL 6400 acres 10 year oil and gas leases. Locatd in 5 W.—19 S. of Sierra County, New Mexico. Altitude and Latitude comparable to Artesia pool. Near R. R. and Highway. No tests of importance ever drilled near. O. S. Fierbaugh, P. O. Box 1396, Albuquerque, New Mexico.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases. Drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

NEW MEXICO OILFIELDS

We have prepared data of vital interest to royalty & lease buyers covering important oilfield in Roosevelt County & potential fields in Chaves & DeBacca Counties. Also a semiproven drilling operation. Details on request.

W. J. PETERMAN, GEOLOGIST
Portales, New Mexico

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis 5, Mo.

PRODUCTION

Oil and gas producing leases of great merit that will stand the most rigid investigation. I now have several properties at prices ranging from $250,000 to $1,000,000. Will submit deals complete with geological and evaluation reports to qualified parties. Ideally set up for company financing. Correspondence of accredited investment houses invited. Fullest cooperation assured.

ARTHUR DAVIDOR

Oil Operator 35 yrs. experience
1412 N.W. 38th St., Oklahoma City, Okla.

LEASE AND DRILLING BLOCKS

FOR SALE: 640 acres Big Horn County, Wyoming (very hot); 20,000 acres in Central and Eastern Montana (scattered counties); 20,000 acres, North Dakota; 30,000 acres, South Dakota; 10,000 acres, Colorado; 30,000 acres, Nebraska (scattered counties). Prices and terms to properly interested parties. Dyer O.J. 1835 Champa St., Denver, Colorado.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

INDEPENDENT OPERATOR will buy producing royalties, over-rides, or settled production, small or large. Quick action. Box E-118, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

INVESTMENT OPPORTUNITIES: Wish to contact parties to finance oil drilling deals. Excellent opportunity to invest tax money. Box E-102, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

MODERN well-planned homes in restricted district. Residential, commercial and industrial properties. Clem Casey, Bismarck, N. D.

FOR SALE: Attractive Ranch-type Cottage on beautiful Lake Pelican, Minnesota. Completely modernized. Near Senator Kerr's Cottage. Write J. J. Thomas—Seward, Nebraska.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908 Oil-Gas (all states), Business, Real Estate Legal Forms, Leases, Revised With Government Regulations, Commercial Printing Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

WANTED

WANTED: Partner with Capital to develop Oil Lease in Southern Central Ky. (Incorporated). Located by Geology and Geophysics. Particulars—H. C. Roffey, Columbia, Ky.

FOR SALE

SUGAR CURED COUNTRY HAMS
Aged and guaranteed.
15 to 20 lbs. Hickory smoked — $1.15, sassafras smoked — $1.35 per lb. f.o.b. C.O.D.
SOURWOOD MOUNTAIN FARMS
Sunbright, Tennessee

N. Central Texas

(Continued from page 187)

Jack Grace Production Co. 1 Grace-Star, C. J. C. O'Conner Sur., dry, TD 5,708 ft., conglomerate 5,325 ft.

Lowell F. Oil Co. 1 J. A. Conner, R. Crisp Sur., dry, TD 5,186 ft., elev. 951 ft., Caddo 4,491 ft.

Wheeler, Ingraham & Jennings 2 J. R. Clayton, TE&L Sur., dry, TD 4,976 ft., elev. 1,135 ft., Caddo 4,529 ft., Marble Falls 4,973 ft.

Jones County: Drilling & Exploration Co., Inc., et al 1 W. D. Briston, J. H. Gibson Sur., dry, TD 3,440 ft., Flippen 2,926 ft., Swastika 3,421 ft.

Ralph Harper 1 E. F. Van Treese, Kirkland Sur., dry, TD 2,754 ft., Flippen 2,350 ft., Hope 2,495 ft.

Montague County: E. B. Clark 1 J. G. Howard, Kaufman CSL, dry, TD 3,964 ft.

Nolan County: T. C. Billiups et al 1 W. L. Ray, 242-64-H&TC, dry, TD 4,305 ft., reef 4,280 ft.

Honolulu Oil Co. 1 S. D. Herring, 170-1A-H&TC, dry, TD 7,007 ft., Elm Creek 3,180 ft., Sedwick 3,620 ft., Noodle Creek 3,789 ft.

Parker County: Kingwood Oil Co. 1 G. O. Hutcheson, S. Stinnett Sur., dry, TD 3,506 ft., elev. 1,072 ft., Daly reef 3,369 ft.

Shackelford County: Big West Drilling Co. 1 J. H. Nail 6, Sec. 38, ETRR Sur., dry, TD 1,255 ft.

Big West 1 Nail 7, Sec. 52, ETRR Sur., dry, TD 1,305 ft.

Stephens County: J. W. Baldwin 1 G. V. McGowan, 74-61T&P, dry, TD 2,054 ft.

R. Clay Underwood 1 Blanche Winston, 38-5-T&P, dry, TD 2,310 ft.

Stonewall County: Oxford Drilling Co. 1 Mrs. A. L. Lewis, 158-1-BBB&C, dry, TD 6,286 ft., elev. 1,743 ft., Caddo 5,820 ft., Mississippian 6,090 ft., Ellenburger 6,205 ft.

Taylor County: Sol Minzer and Joe Josephson 1 B. L. Bond, 15-14g-Grimes CSL, dry, TD 4,860 ft., elev. 1,837 ft., Swastika 3,065 ft., Palo Pinto 4,335 ft.

Throckmorton County: Barron Kidd 1 Elmo Forrest, Sec. 908, TE&L Sur., dry, TD 4,634 ft., Palo Pinto 2,108 ft., Mississippian 4,605 ft.

Wichita County: J. E. Gray 3 J. H. Bentley, CTRR Sur., dry, TD 205 ft.

Hale & West 1 Opella, E. Scurry Sur., dry, TD 4,564 ft.

Staley Hawkins 1 Staley Hawkins, John Aldridge Sur., dry, TD 305 ft.

Wilbarger County: J. H. Staley 1 W. T. Waggoner, Blk. 4, H&TC, dry, TD 2,515 ft.

Illinois Fields

(Continued from page 186)

Gallatin County: Oil Management, Inc., 1 Myers, SW NE SE 35-7s-8e, dry, TD 2,544 ft.

Hamilton County: Mark Twain Oil Co. 1 Cox, SW SE SW 26-5s-5e, dry, TD 2,975 ft.

Jefferson County: Wiser Oil Co. and Dale Hopkins 1 Burr Oak, NE NW SE 5-4s-2e, dry, TD 2,684 ft.

Superior Oil Co. 1 Burton et al, SE SE NW 25-4s-4e, dry, TD 3,382 ft.

Lawrence County: L. P. Newell 1 Williams, NW SE NE 8-3n-11w, dry, TD 485 ft.

Macoupin County: H. E. Livermore 1 Lee, NE SW NE 14-9n-8w, dry, TD 485 ft.

Madison County: H. H. Moses 1 Meier, NEc SW NE NE 4-5n-6w, dry, TD 600 ft.

Montgomery County: W. C. Nichols and Calvert Drilling, Inc., 1 Kurfiss, SE SE SE 18-10n-4w, dry, TD 2,050 ft.

Richland County: Cities Service Oil Co. 1 Campbell, NW NE SE 21-3n-10e, dry, TD 3,275 ft.

Sun Drilling Co. 1 Bunn, NE SW NE 33-3n-14w, dry, TD 3,155 ft.

Wabash County: A. W. Cherry 1 Tennes, SE SE NE 21-1s-13w, dry, TD 2,625 ft.

Washington County: Pure Oil Co. 1-A Hesemann, SE SW SE 18-1s-2w, dry, TD 3,492 ft.

E. A. Obering 1 Hehman, NW NE NW 36-1s-4w, dry, TD 2,763 ft.

Wayne County: W. E. Weidler 1 Riley, S½ NE NW 26-1s-7e, dry, TD 3,354 ft.

Slagter Production Co. 1 J. T. Fogle Estate, SE SE NE 11-3s-5e, dry, TD 3,450 ft.

White County: J. B. Buchman and C. E. O'Neil 1 Austin Heirs, NW NW SE 30-6s-9e, dry, TD 3,360 ft.

INDIANA SUCCESSFUL WILDCAT

Vanderburgh County: Slagter Production Co. 1 Kissel, SW SW NE 30-4s-10w, IP 30 bbl., Jackson 1,964-88 ft., TD 2,389 ft. (opens Stacer West pool).

INDIANA WILDCAT FAILURES

Clay County: Dome-Minnick Oil Co. 1 Danhauer, NW SW NW 16-13n-6w, dry, TD 1,404 ft.

Daviess County: H. Eiteljorg 1 Wesner, SE NE SW 2-5n-6w, dry, TD 700 ft.

Jack Maness 1 Lunch, W½ SE NW NW 14-3n-7w, dry, TD 1,470 ft.

Gibson County: George & Wrather 1 McConnell, SW NW SW 32-1s-9w, dry, TD 1,805 ft.

Knox County: Graham Development Co. 1 Martin, NE NE NE 28-2n-8w, dry, TD 1,497 ft.

Posey County: Calvert Drilling, Inc., 1 Cahoon, SW SE NW 30-4s-12w, dry, TD 2,912 ft.

A. J. Slagter 1 Campbell, SW NE NW 15-4s-13w, dry, TD 3,000 ft.

Shelby County: John Hughes 1 Sandman, NWc NE NW SE 35-14n-6e, dry, TD 950 ft.

Sullivan County: F. B. Cline 1 Rowe & Bland, NW NE SE 8-9n-10w, dry, TD 2,465 ft.

J. E. Thornton 1 Drake, NE SE NW 10-9n-10w, dry, TD 1,562 ft.

D. Chaney 1 Kisner-Woodward, NW NW SW 16-9n-10w, dry, TD 1,609 ft.

F. B. Cline 1 Richardson-Cemetery, NW NE SW 33-8n-9w, dry, TD 1,580 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Crittenden County: Sun Oil Co. 1 Howerton, NE SE NW 8-K-18, dry, TD 535 ft.

Daviess County: Morgan Brothers et al 1 Greer, SE NE SW 22-N-30, dry, TD 1,279 ft.

Ellis-Morrison and Producers Pipe Line Co. 1 Hancock, SE SE NW 15-O-28, dry, TD 2,086 ft.

Henderson County: George S. Engle 1 Parker-McCandless, NW NE NE 21-P-24, dry, TD 2,465 ft.

V. L. Gallagher 1 Spencer, SE NW NW 2-N-24, dry, TD 2,155 ft.

McLean County: Basin Drilling Co. 1 Osborne, NEc SE NW SE 8-N-26, dry, TD 2,210 ft.

EASTERN KENTUCKY

ASHLAND—In eastern Estill County and on northwest edge of the Big Sinking pool, V. P. F. Co. has completed two producers on its Monroe Faulkner lease. Tests 5 and 6 came in for 5 bbl. oil daily from Corniferous lime at an average total depth of 844 ft. The company's 4 Faulkner had previously been completed as a dry hole.

In Johnson County on the west side of Martha pool, Ashland Oil & Refining Co. was coring Weir sand at 14 William Lester on Keaton Branch. Top of Weir was logged at 890 ft., and coring was progressing below 900 ft.

EQUIPMENT MEN

(Continued from page 194)

American Meter Names New Key Executives

American Meter Co., Inc., has announced the election of John C. Diehl as chairman of the board, and W. G. Hamilton, president. Diehl was previously president and vice president. Hamilton has been with the company since 1927, and was formerly vice president in charge of sales.

American Meter has also announced the election of W. B. Ashby as secretary. He was formerly assistant to the vice president in charge of sales.

British Firm Licensed to Manufacture McEvoy Valves

Under an agreement reached more than a year ago, the British Manufacturing firm of Newman, Hender & Co., Ltd., Woodchester, England, has begun production of an English ver-

sion of the McEvoy gate valve, to be called the Newman-McEvoy valve. The McEvoy Co. of Houston issued this license to enable Newman, Hender to manufacture and distribute McEvoy gate valves for the oil-production industry to sterling-bloc markets throughout the world.

Willard O. Hedrick, vice president in charge of production for McEvoy, will be present at Woodchester to put the McEvoy seal of approval on the first Newman-McEvoy valves to be manufactured under the agreement.

Zink Announces Speakers For Second Seminar

R. H. HAYMAN

R. A. WITSCHEY

John S. Zink, John Zink Co., has announced the speakers for the Second Process Heating Seminar to be held at the John Zink plant, Tulsa, Saturday, May 26.

R. H. Hayman, senior chemical engineer of W. H. & L. D. Betz, will read a paper on "Water Treatment"; R. A. Witschey, ceramic engineer,

A. P. BUTHOD

P. M. REYNOLDS

A. P. Green, will read a paper on "Refractories for Process Service"; Prof. A. P. Buthod, Tulsa University, will read a paper on "Radiant Heat Transfer Considerations in Process Heaters"; and P. M. Reynolds, process engineer, Mid-Continent Petroleum Corp., will give a paper on "Factors Affecting Throughput in Catalytic Cracking."

Men wishing to attend the seminar may do so by writing or telephoning John Zink Co. at Tulsa. After technical sessions, the entire group will be guests of John Zink at a buffet dinner.

LEGAL

7,120 ACRES of Tribal and 80 ACRES of Allotted Indian lands located in Townships 2, 3 and 4 South, Ranges 8, 9 and 10 West, within the jurisdiction of the Uintah and Ouray Reservation, Utah, are being advertised for lease, bids on which will be opened June 7 at 2:00 P.M. at the office of Forrest R. Stone, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from Mr. J. R. Schwabrow, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

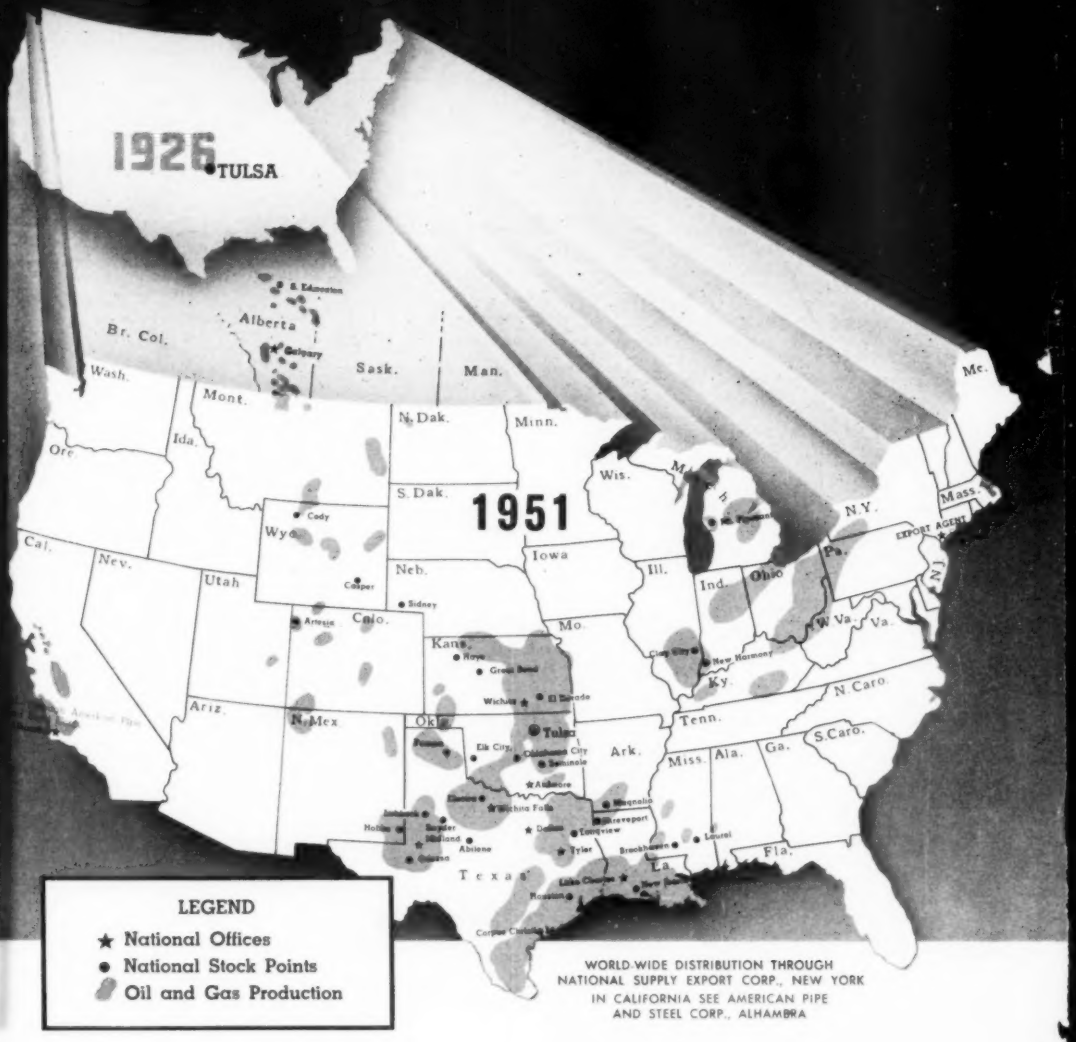
ADVERTISERS

Acme Protection Equipment Company 175
Air Reduction Sales Co. 40
Altens Foundry & Machine Works 175
Amercoat Corporation 34
American Bosch Corporation 39
Baker Oil Tools, Inc. 70
Barton Instrument Corporation 155
Beckman Instruments, Inc. 55
Bethlehem Supply Co. 1
Blaw-Knox Construction Company 50
Bonney Forge & Tool Works 29
Briggs & Stratton Corp. 63
Broderick & Bascom Rope Co. Back Cover
Brown & Root, Inc. 2
Butler Manufacturing Co. 143
Byron Jackson Co. 192
Cameron Iron Works, Inc. 111
Chase Brass & Copper Co. 5
Chemical & Geological Laboratories 136
Chicago & Southern Air Lines 180
Chicago Metal Hose Corporation 107
Christensen Diamond Products Co. 168
Clark Bros. Co., Inc. 51
Classified Advertising 193, 196, 197, 198
Cleveland Trencher Company, The 156
Continental Supply Co., The 140, 141, 142
Coppus Engineering Corp. 3
Crane Co. 7
Crose Manufacturing Co., Inc., M. J. 161
Crutcher-Rolfs-Cummings 156
Darling Valve and Mfg. Co. 185
Davison Chemical Corp., The 117
Dean Brothers Pumps, Inc. 162
Delta Engineering Sales Co. 170
Detroit Diesel Engine Division, General Motors Corp. 16
Dewey and Almy Chemical Company 177
Dowell Incorporated 157
Dresser Industries, Inc. 116
Dresser Manufacturing Division 116
Drilling & Service, Inc. 186
Electric Auto-Lite Co., The 179
Elliott Co. 48, 49
Emerol Manufacturing Co., Inc. 171
Empire Trust Company 122
Ensign Carburetor Company 27
Fairbanks, Morse & Co. 171
Farrel-Birmingham Co., Inc. 37
Fleet Drilling Company 87
Flexible Pipe Cleaning Co. 160
Floridin Company 155
Fluor Corporation, Ltd., The 169
Gardner-Denver Company 152
General Electric Company 104, 105
Gilmer Company, L. H. 178
Glass Fibers, Inc. 160
Goodall Rubber Company 150
Goodrich Chemical Company, B. F. (Hycar) 101
Grancell, I. H. 165
Grinnell Company, Inc. 8
Guiberson Corporation 127
Gunite Concrete & Construction Co. 170
Halliburton Oil Well Cementing Co. Inside Front Cover
Harrisburg Steel Corporation 120
Hazard Wire Rope Division of American Chain & Cable Co., Inc. Inside Back Cover
Hill, Hubbell and Company, Division of General Paint Corporation 113
Hudson Engineering Corporation 110
Hughes Tool Co. Front Cover
Independent Exploration Co. 36
Inferno Co., The 176, 192
Insul-Mastic Corporation 188
Jensen Brothers Mfg. Co. 167
Jewel Manufacturing Company 169
Johns-Manville Corporation 31
Jones Company, The S. M. 14
Kaar Engineering Co. 187
Kieley & Mueller 30
Knight Mfg. & Supply Co. 65
Lane-Wells Company 66
Larkin Packer Company, Inc. 103
Leeds & Northrup Co. 15
Levingston Shipbuilding Co. 161
Lockett & Co., Ltd., A. M. 192
Lone Star Cement Corporation 68
Lufkin Foundry & Machine Co. 24
Lummus Co., The 6
Maintenance Engineering Corp. 32
McCord Corporation 158
McKee & Co., Arthur G. 114
McKissick Products Corporation 176
Midwest Piping & Supply Co., Inc. 123
Minneapolis-Moline 187
Mission Mfg. Company 183
Moore Corporation, Lee C. 138
Murphy Diesel Company 9
Murphy, Frank W. 175
Nash Engineering Co. 25
National Airoil Burner Co., The 170
National Supply Co., The 17, 18, 19, 20
National Tank Company 200
National Tube Company 33
Norris Brothers, Inc. 162
Oakite Products, Inc. 171
Oil and Gas Journal, The 56, 57
Oil Center Tool Co. 130
Oil Well Supply Co. 4
O'Neill & Co., Grover 170
Owens-Illinois Glass Co., Kaylo Division 10
Pacific Pumps, Inc. 181
Page Fence Association 179
Paris Distributor, Inc., Henry H. 162
Parkersburg Machine Company 176
Parkersburg Rig & Reel Co. 184
Patterson-Ballagh Division of Byron Jackson Co. 53
Peerless Mfg. Co. 121
Peerless Pump Division of Food Machinery & Chemical Corporation 52
Penberthy Injector Co. 158, 187
Penn Electric Switch Co. 137
Pennsylvania Flexible Metallic Tubing Co. 44
Perrault Brothers 158
Petroleum Distributing Co. 166
Petroleum Electric Power Association 21
Petroleum Industry Tax and Court Service 166
Powell Co., The Wm. 11
Powers Regulator Co., The 146
Pure Oil Company, The 124
Read Standard Corporation 59
Rector Well Equipment Co., Inc. 22
Reed Roller Bit Company 94
Regan Forge & Engineering Co. 46
Republic Flow Meters Co. 23
Republic Steel Corporation 42
Reynolds Metals Co. 62
Schlumberger Well Surveying Corp. 54
Scott Aviation Corp. 177
Seismograph Service Corp. 90
Shaffer Tool Works 58
Smith Corporation, A. O. 45
Smith Oil Tool Co., H. C. 164
Southern Mill & Mfg. Co. 28
Spang-Chalfant Division of The National Supply Co. 18, 19
Spicer Mfg., Div. of Dana Corp. 148
Standard Oil Co. of Indiana 43
Standard Oil Co. of New Jersey 132
Standco Brake Lining Co. 166
Stanfield, E. C. 131
Taylor Instrument Companies 35
Thermo Electric Co., Inc. 187
Thew Shovel Company 38
Thomas Flexible Coupling Co. 128
Timken Roller Bearing Company 119
Tri-Clover Machine Co. 133
Tubing Appliance Co. 167
Ultra Violet Products, Inc. 158
Union Wire Rope Corporation 12, 13
U. S. Steel Corp. Subsidiaries 4, 33, 172
Universal Atlas Cement Co. 172
Up-Right Scaffolds 115
Vapor Recovery Systems Co., The 109
Victor Products Corp. 170
Vogt Machine Co., Henry 26
Wallace & Tiernan Products, Inc. 61
Walter Motor Truck Co. 41
Warner Lewis Company 158
Web Wilson Oil Tools 187
Well Equipment Mfg. Corp. 135
Western Supply Company 159
Wilson Products, Inc. 64
Wilson Manufacturing Co., Inc. 47
Wolverine Tube Division, Calumet & Hecla Consolidated Copper Co., Inc. 60
Wood's Sons Co., T. B. 165
Wright Chemical Corporation 129
Youngstown Sheet and Tube Company 65

LEGAL

U.S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that the SW¼ sec. 24, T. 34 S., R. 41 W., 6th P.M., Kansas, 40 acres, within the known geologic structure of the Hugoton gas field, undefined, will be offered for oil and gas leasing, through competitive bidding, at 1 p.m., Eastern Standard Time, June 13, 1951, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

TABLE OF CONTENTS ON PAGE 69



WORLD-WIDE DISTRIBUTION THROUGH
NATIONAL SUPPLY EXPORT CORP., NEW YORK
IN CALIFORNIA SEE AMERICAN PIPE
AND STEEL CORP., ALHAMBRA

As the Oil and Gas Industry Goes . . .
So Goes NATIONAL TANK!

Contrasted with one small office and plant in 1926, the National Tank Company today has many offices, stock points and service centers to meet the ever-growing demand for National products. Included is the National Supply Export Corp. which handles world-wide foreign distribution of National products. Wherever your operations in the oil producing world, you can count on National for expedient, dependable handling of your needs.

It's National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

BRANDS are important!

Cattle are branded primarily to prove ownership.
But, experienced cattlemen and livestock buyers know that
some brands are always found on higher quality animals.
These brands come from better feed and water,
from better breeding stock, from better handling.
The HAZARD brand on a reel of wire rope is your assurance of quality—
quality backed by wire rope manufacturing experience
dating back to 1846. Next time specify HAZARD.
Remember—**"Brands are important!"**

ACCO *In Business for Your Safety*

AMERICAN CHAIN & CABLE
HAZARD WIRE ROPE DIVISION

TRADE MARK

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, Odessa, Tex., Pittsburgh, San Francisco, Bridgeport, Conn.

Unwrap this saving

...BY CONSISTENTLY USING LONG-WEARING B & B WIRE LINES

One test of a B & B line can demonstrate flexibility and ease of handling. But it's the repeated use that brings out the long life gained through high resistance to abrasion and fatigue. Preformed Yellow Strand Rotary Drilling and Casing Lines and Brodril Cable Tool Drilling Lines are engineered to deliver low *final* cost on today's tougher, deeper wells. Specify them. And for matching performance with sand lines, rod and tubing lines and other oil field ropes, see that they, too, are top-grade Preformed Yellow Strand.

Broderick & Bascom Rope Co., St. Louis 15, Mo.

Houston Factory and Branch: 9350 Market Street Road
Los Angeles Branch: 2441 Hunter Street
San Francisco Branch: 899 Bryant Street

THE CONTINENTAL SUPPLY CO.
Mid-Continent Distributors—Stores in All Active Fields

THE McJUNKIN SUPPLY CO.
Charleston, West Virginia

BRODERICK & BASCOM
Yellow Strand
PREFORMED WIRE ROPE